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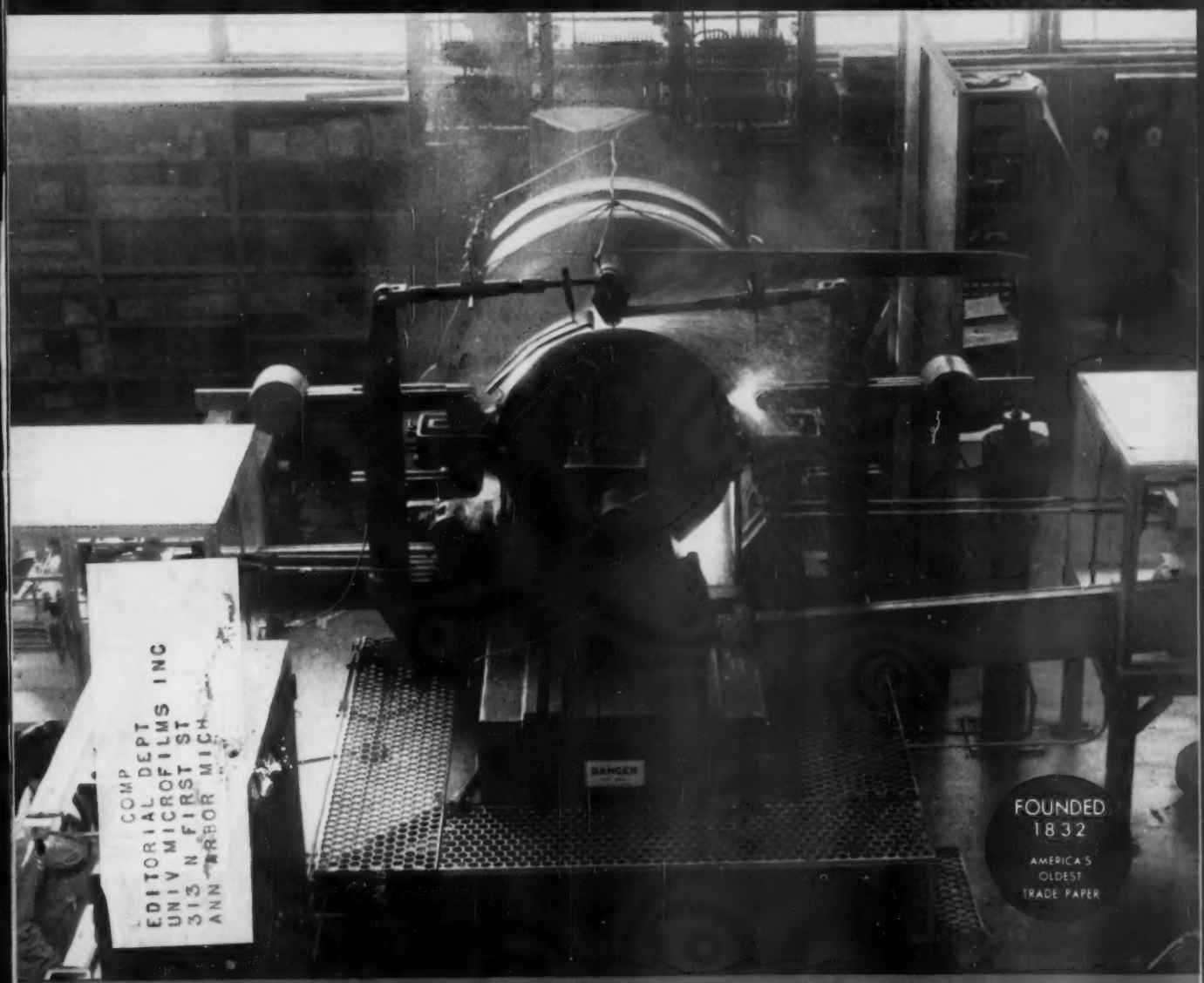
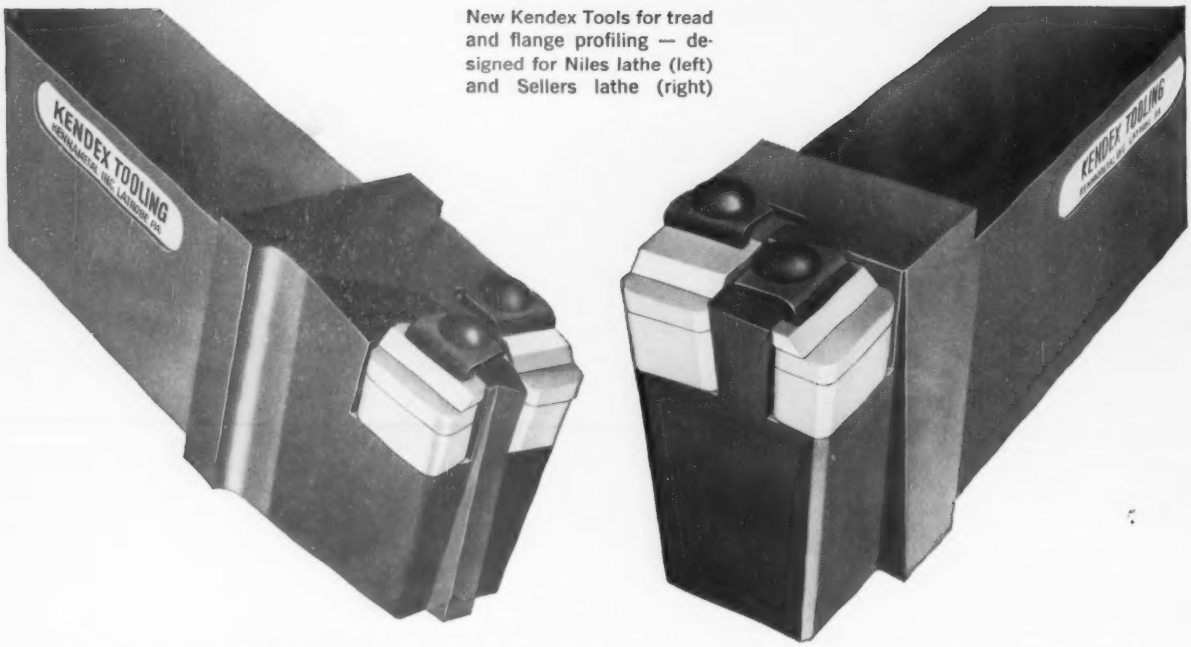
RAILWAY
LOCOMOTIVES AND CARS
MARCH 1961



AAR Investigates Wheel Stresses . . . page 21



New Kendex Tools for tread and flange profiling — designed for Niles lathe (left) and Sellers lathe (right)

New KENDEX* tooling cut tool-cost-per-wheel 73% on one job—77% on another

Designed specifically for wheel turning, these new Kendex tools have proved their cost-cutting value—as detailed in the reports of two typical jobs.

The big factor is elimination of all regrinding, made possible by using clamped, turnover-type Kendex inserts that have eight indexable cutting edges. When an edge becomes dull, the clamp is released and the insert is given a quarter-turn to a new, sharp edge. It is then reclamped without disturbing the tool, so there is no need to reset or gage the tool. When each of the eight edges has been used, the insert is discarded and replaced by a new one.

A Kennametal* shim provides a solid seat for the insert—and when required, permits the use of harder, more wear-resistant grades of Kennametal. Chipbreakers of Kennametal provide better chip control and eliminate chipbreaker grinding.

For further information on how Kennametal tools can cut your costs, contact your Kennametal Representative or write for Catalog RR 259. KENNAMETAL INC., Latrobe, Pa.

*Trademark

Operation: Profiling tread and flange 40" diesel wheels on car wheel lathe at 1/16" feed and 7/8" maximum depth of cut

	Conventional Tooling	Kendex Tooling
Number of wheels (basis of comparison)	2710	1973
Wheels per edge	6	8
Time required to change tool	15 min.	5 min.
Cost of carbide only per set of wheels	$.818	$.312
Regrinding cost per set	$.33	Not required†
Carbide plus grinding per set	$1.15	$.312

Operational Data: Car wheel lathe, turning 33", 36" and 40" diameter wheels at 14 to 16 rpm, 1/16" to 3/32" feed, and 5/8" maximum depth of cut

	Kennametal "H" type tooling with Kennametal K21 inserts	New Kendex tooling with Kennametal K21 inserts
Insert cost	$15.13	$4.03
Insert regrinding cost	9.00 (10 regrinds)	NO regrinding†
Total insert cost	$24.13	$4.03
Wheels per cutting edge	6	6
Cutting edges per insert	11 (orig. edge + 10 regrinds)	8†
Wheels per insert	66	48
Insert cost per wheel	$24.13 ÷ 66 = .366	$4.03 ÷ 48 = .084

†Kendex tooling eliminates all regrinding

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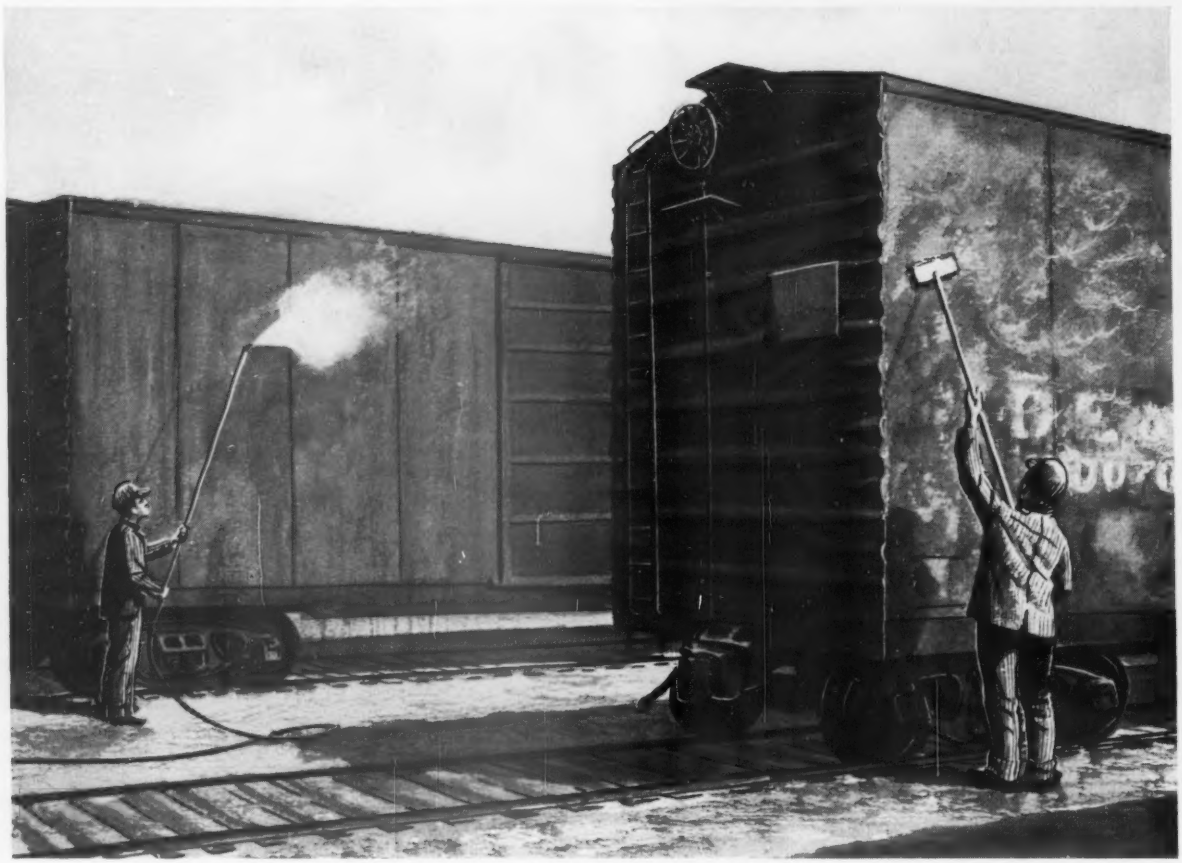

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RAILWAY
LOCOMOTIVES AND CARS

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March, 1961—Vol. 135, No. 3

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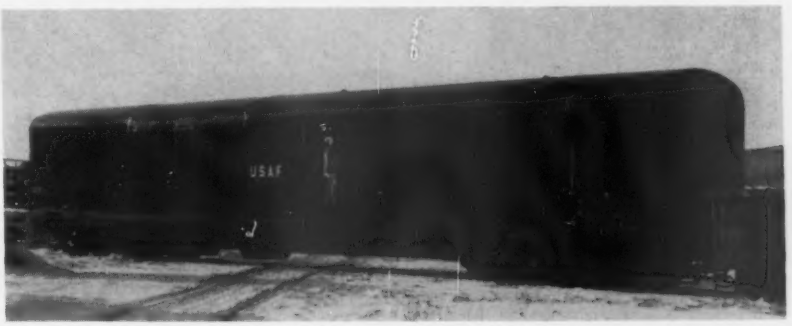
REPORT FOR MARCH



Missile Launch Car Completed by ACF

First missile launch car, an important component of the Air Force Minuteman weapons system, has been delivered by ACF Industries. The launch car moved from the ACF Berwick, Pa., plant to the Seattle, Wash., plant of Boeing Aircraft Company over the Pennsylvania, Milwaukee, and Union Pacific. At Boeing, it is being fitted with launch gear for the three-stage, solid-fuel missile.

The Minuteman weapons system will consist of missiles deployed in strategically located underground launcher areas and on trains moving at random over the U. S. railroad network. At any given moment, ready "birds" resting in missile cars, will be sitting on railroad sidings, their weapons aimed to strike predetermined targets. Other trains will be on the move, always within minutes of one of the many preselected launching points. The trains will move continuously over various railroads, confusing enemy targeting operations.

The Minuteman system is being developed by the U. S. Air Force under the supervision and direction of the Ballistic Missile Division of the Air Research and Development Command to complement other weapon systems of the Strategic Air Command.

Boeing, weapon system integrator for the three stage, solid-fuel-propelled missile, selected the team of American Machine & Foundry Co. and ACF Industries to jointly design, develop and produce cars from which the missile could be launched, as well as command cars that will be used for control and operations. ACF also is developing the power-car rolling stock for the missile train.

A forerunner of the present car, also produced by the AMF-ACF team, was unveiled last summer (RL&C, Aug. 1960, p 12). Designed strictly for road-test purposes, it formed part of a mock missile train that roamed parts of the United States to confirm the capability of American railroads to support operational requirements.

The missile car has the external characteristics of a baggage car and is equipped with three-way cushioning, according to ACF. It is 88 ft long over couplers, 79 ft 6½ in. over end sills, 10 ft 2 in. wide, 15 ft ¾ in. high, and complies with AAR strength requirements. It rolls on a pair of three-axle, roller-bearing trucks.

Hydraulic shock absorption with a moving center sill gives maximum protection from end impacts. Compressed air returns the cushioning gear to a neutral position relative to the under-frame following an impact. The outside swing-hanger trucks have an air-spring suspension in parallel with standard helical coil springs. Trucks also

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OF NEW FREIGHT CARS
THAN EVER BEFORE WENT ON
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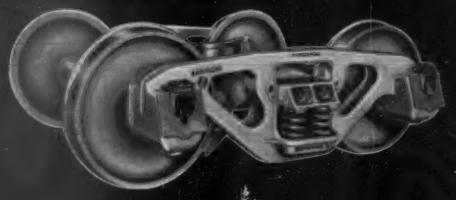

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Basic design of the National C-1 Truck has remained unchanged since its introduction over 12 years ago—because the C-1 design was right to begin with and needed no change. Strong claims? For sure. But here's proof of the soundness of C-1 Truck design.

Service parts records show an average replacement rate of only .00129% for wedges, wedge springs and wear plates.

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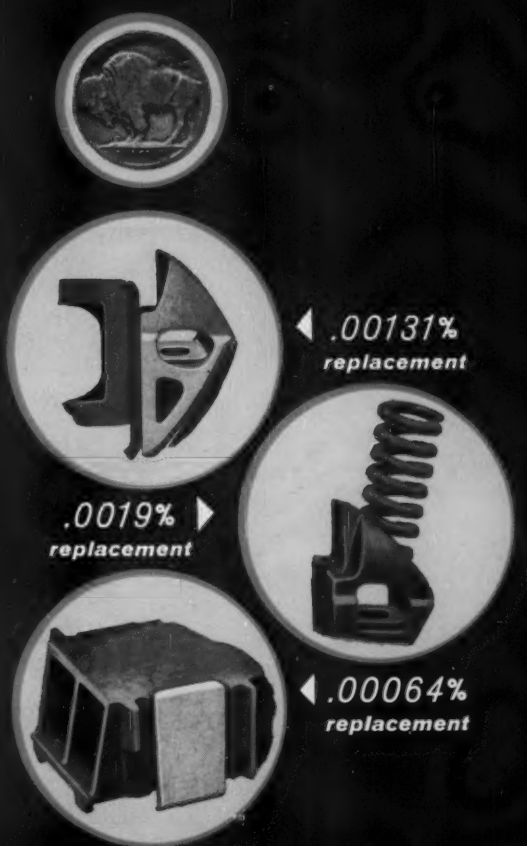

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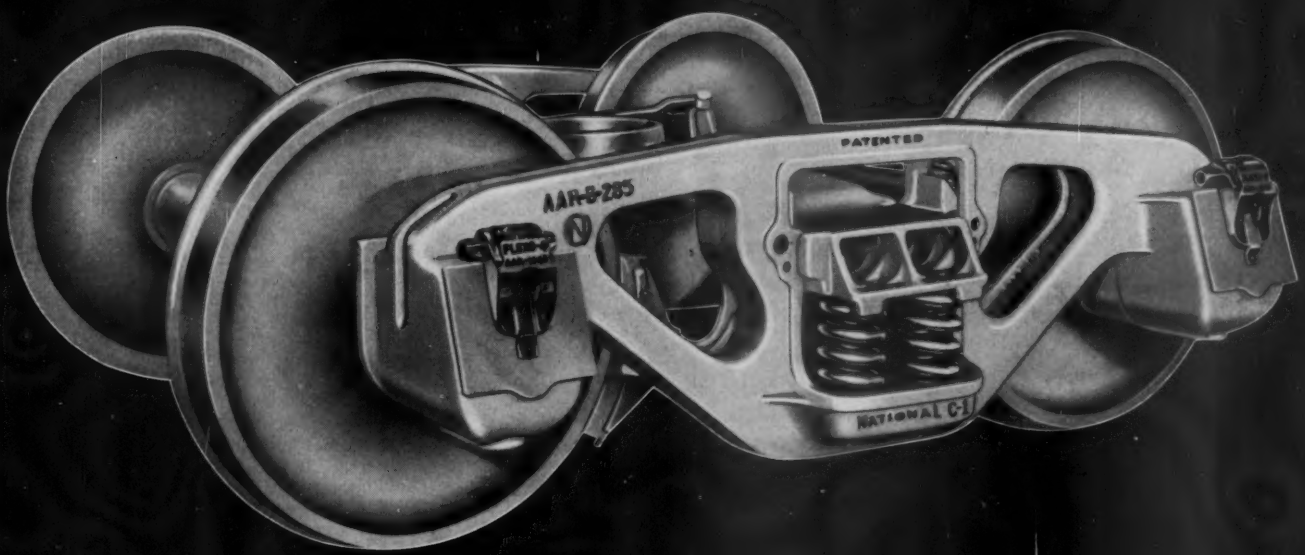
C-1 TRUCKS



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(Continued from page 5)

are fitted with rotary type shock absorbers. Air springs and leveling valves keep coupler height constant whether or not the more-than-30-ton missile is on board.

The car is designed with 12 jack pads that actually lift it slightly off the rails to provide a stable platform for the missile shoot. Doors built into the arched roof automatically open, permitting the Minuteman to rise into its vertical launch position.

At the time of a shoot, the car would come to a complete stop and a truck-lockout system would be engaged temporarily to lock the trucks to the underframe. Then the 12 jack pads would descend and raise the car into its final launch position. Connected to those jacks nearest the actual launch pad at one end of the car is a 10-ft square steel flame deflector that lowers over the ties and rails and protects them from the missile blast. The launch area door then slides toward the end of the car, leaving an opening directly over the launch pad. The main roof doors, each 45 ft long and half the width of the car, open and the missile is raised to its launch position on the pad.

Long-Cushion Effective, P-S Impact Tests Show

Desirability of using the 20-in. cushion instead of the 10-in. model under auto racks on three-deck auto transport cars is "self evident," according to Pullman-Standard. Tests were made recently at the Pullman Research and Development Center in Hammond, Inc. (RL&C, Feb. 1961, p 42).

Forces and stresses were greatly reduced on the Lo-Dek car fitted with Dana three-level racks when the 20-in. cushion replaced the standard 10-in. type. While the long travel arrangement has not received ICC approval, the car's deck can accommodate either type.

Fully loaded tri-level car can carry 12 standard autos or 15 compacts. Results on a fully loaded Lo-Dek showed efficiency of 20-in. cushions:

	8 mph	10 mph
10-in. cushion:		
Coupler force, lb.	574,000	880,000
Cushion force, lb.	132,800	173,900
Rack travel, in.	10⅝	10¾
Acceleration (G)	1.63	2.18
20-in. cushion:		
Coupler force, lb.	550,000	902,000
Cushion force, lb.	93,700	133,200
Rack travel, in.	17⅝	19¾
Acceleration (G)	1.2	1.53

CTA Building Rapid Transit Shop

The Chicago Transit Authority has awarded a $969,900 contract for building a rapid transit service and inspection shop at the Desplaines Avenue terminal in Forest Park, Ill. The new building, scheduled for completion about May 1962, will cover an area of 26,000 sq ft, and provide maintenance and inspection facilities for rapid transit cars operating on the Congress, Douglas and Milwaukee routes.

The shop will accommodate 12 cars at a time and is to be arranged so that service, maintenance and repairs can be performed on a production line basis. Overhead cranes and monorails will be provided. Cars to be serviced will be run over a pit for cleaning before entering the building. Inside, the cars will be on elevated tracks above the working floor. A new arrangement has been developed so that each truck can be raised from the track for inspection and run at full speed if necessary for testing.

A hoist will be installed which will raise two cars together 5 ft above the normal track level. From this position any one or all trucks can be lowered for removal and replacement. New trucks would be rolled into position over electric turntables. The entire mechanism will be controlled by push-buttons and provided with safety devices.

Other facilities will include storage areas for repair parts, an upholstery shop, and an automatic car washer. Tracks to store 100 cars during off-peak periods will be provided.

ASME-AIEE Railroad Conference Cancelled

The Railroad Conference to have been sponsored by the Railroad Division of the ASME and the Land Transportation Committee of the AIEE April 20 and 21 has been cancelled. This conference, to have been held at the Sir Francis Drake Hotel, San Francisco, would have been the fourth such meeting of the two groups. Previous conferences were held at Cleveland, Chicago, and Pittsburgh.

Electrical Developments Discussed by AIEE

Automation, electrification, and improved diesel-electric locomotives — all developments which can do much to change railway operation and maintenance practices — were topics of the recent Winter General Meeting of the American Institute of Electrical Engineers in New York. New methods and materials were discussed during the three-day session of the AIEE Land Transportation Committee.

"The railroad is an appealing subject for automatic control," R. C. Buck of General Railway Signal Company reported. "With present centralized traffic control and signaling systems, the train's route can be determined from a central office, and information as to maximum permissible speed generated at or brought to the wayside. Coded cab signaling can be used to transmit these commands to the train through the rails.

"What remains is to build a device to make the decisions and take the actions of the engineman. One could build a device he thought would do the job, install it in a locomotive of a willing railroad; try it, and modify it, until an acceptable model was produced. As an alternative, if an artificial train could be built in the laboratory which simulated the responses of a real train closely enough, individual ideas as well as the complete device could be tried on the simulated train at a considerable saving in development time and expense.

"It has been found that the analog computer can be used to simulate a railroad train accurately enough so that details of operation may be studied. Because railway car rolling characteristsics vary widely, depending upon lubrication, temperature, humidity and rail condition, extremely accurate predictions of a train's performance cannot be made. It cannot even be matched empirically because the train will perform differently each day. Useful results can be obtained for the evaluation of different types of throttle handling and of controls, which sense acceleration, and similar conditions.

"Work is being done to improve the accuracy of this simulation by taking into account slack action, train length, dynamic braking, and variation of brake-shoe-to-wheel friction coefficients at different speeds."

S. W. Smith, assistant electrical engineer, Pennsylvania, reported on the extensive electrification now in progress on the British Railways. All phases of this electrification were discussed at a conference held in London in October 1960 which Mr. Smith attended. British Railways have adopted the 25,000-volt, 50-cycle, a-c system which is increasingly popular in many parts of the world. J. W. Horine, PRR electrical engineer and a member of the U. S. delegation which inspected the Soviet Railways in July (RL&C, September 1960, p 9), told about Russian electrifications using the same commercial frequency a-c distribution.

"Economic advantages of power generation and distribution as high voltage alternating current and advantages of d-c motors for traction demand economical means of rectification," E. J. Diebold, International Rectifier Corporation, stated in discussing the developments in semi-conductor rectifiers. The mercury arc tank type rectifiers have been applied on several types of rolling stock in the U. S. (RL&C, Dec. 1960, p 50).

"Semi-conductor rectifiers have many advantages for this purpose, such as small size, high efficiency, wide temperature range, and high mechanical strength," Mr. Diebold concluded. "Semi-conductor rectifier cells for railroad use presently are made almost entirely from monocrystalline silicon. This is an extremely pure semi-metallic substance obtained from common silica. Inherently the material is a very poor electrical conductor, but only a few parts per billion of impurities make it conductive. Some impurities supply positive, some negative conductance. In a thin wafer of single crystal silicon, with positive impurities on one face and negative impurities on the other penetrating the wafer until they almost meet, electric current flows easily from positive to negative, but cannot flow in the reverse direction.

"Presently available semi-conductor power rectifiers are not yet ideal for railroad service, because of limited overload capacity, insufficient intermittent load life, sensitivity to voltage transients, and uncertain reliability. Advantageously, however, they are small size, solid, hermetic and easy to mount; insensitive to motion or position; insensitive to a wide range of ambient and operating temperatures. They are natural rectifiers, requiring no auxiliaries, no maintenance. Their circuitry is simple and flex-

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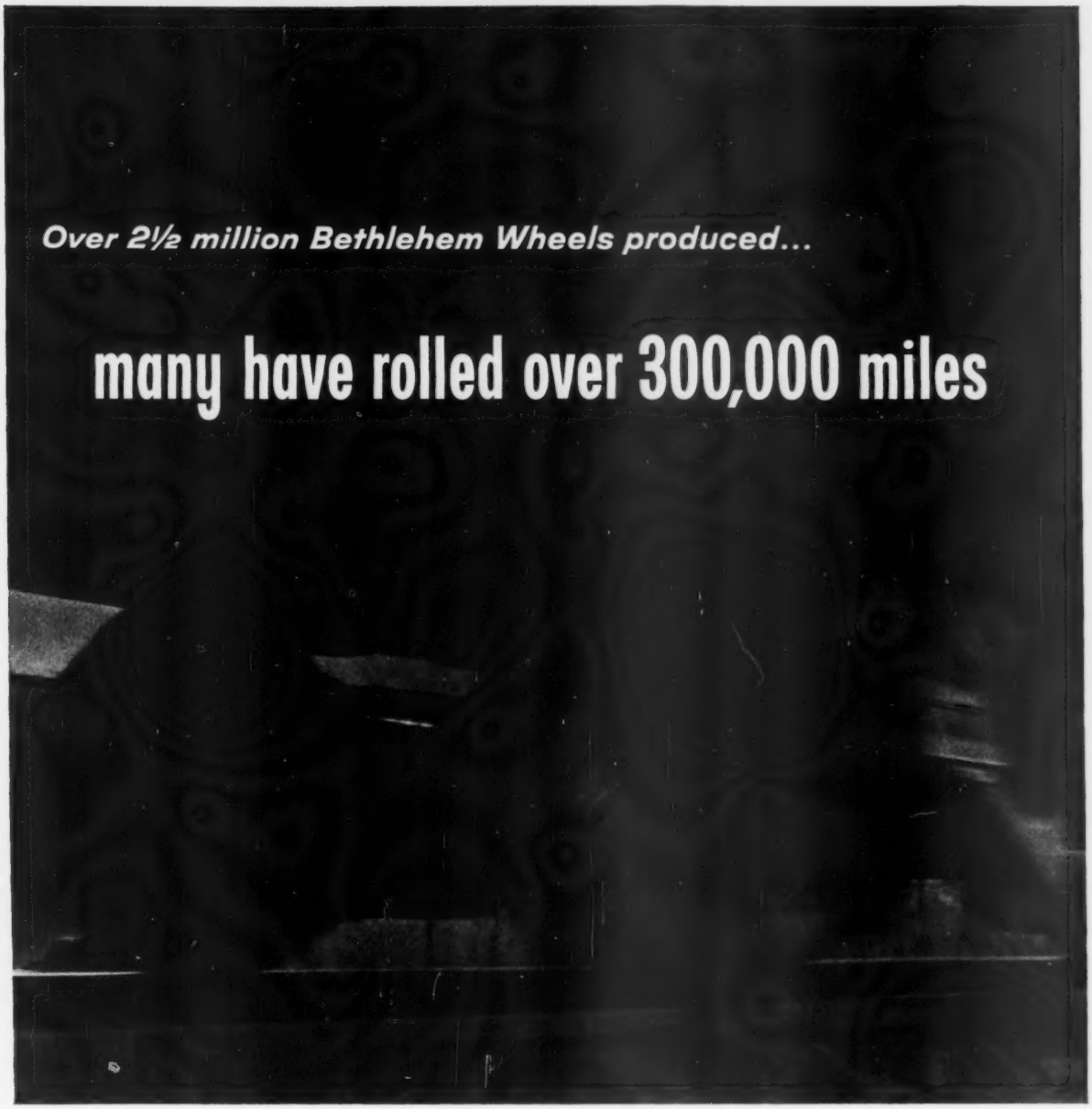

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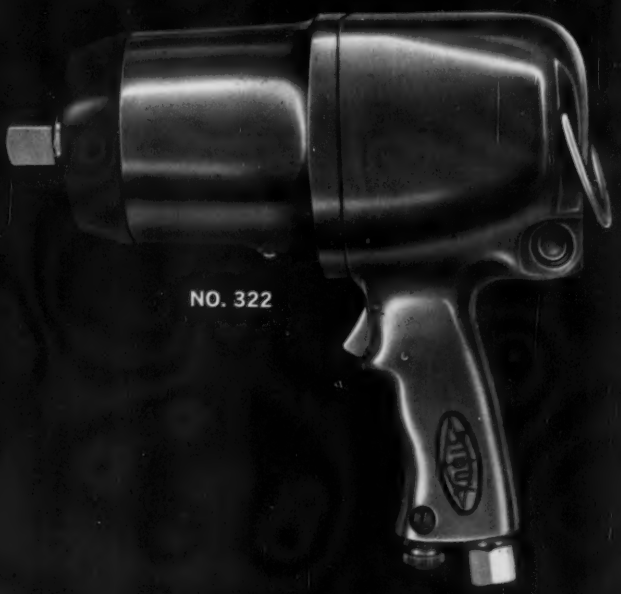

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EDITORIALS

Container Interest Grows

Containers have been developed and used for many years in rail shipments of special products. Yet the acceptance of containers has been slow; the general purpose box car has continued to be the workhorse of the car fleet. Recently, however, there has been a growing interest in the use of containers and their cost-saving and traffic-getting potential in an integrated transportation and materials-handling concept.

In recent weeks the upward trend in containerization was spotlighted on two occasions. One was a speech by John D. Loftis, director of marketing, American Car and Foundry Division, ACF Industries, at a Northwestern University conference on technological change and the future of the railroads. The other was a report on "An Economic Study of Containerization and Its Markets" released by the Reynolds Metals Co.

In his speech Mr. Loftis said "the greatest cost-reducing technological breakthrough of all, ironically, has not as yet been adequately recognized; that is, the separation of the rolling structure of railroad cars from the containing structure—piggyback and containerization." Separation of containing and rolling structures, he said, permits each form of land and water transportation to perform the part for which it is best suited without costly delays of transferring from one to the other.

In the Reynolds report, prepared by H. E. Holmes, seven advantages and four "major difficulties" were set forth. The advantages that may be found in containers are: lower freight rates, lower handling costs, lower in-transit insurance costs, reduced damage, reduction or elimination of pilferage, improved distribution patterns and reduction of warehousing problems.

First of the difficulties is standardization. Mr. Holmes believed establishment of a "family" of container sizes, handling mechanisms, and appurtenances compatible to all modes of transportation is a possibility by 1965. Second, labor requirements are reduced. Like any application of "automation," he said, this difficulty is a short-range displacement of labor and the problem becomes one of cushioning the effects upon labor.

Cost is the third difficulty. Evolutionary progress toward well-designed, well-built and competitively priced units will take time. Last, there is the problem of coordination. Some degree of cooperation and equitable distribution of cost savings among the different carriers is needed.

What does this trend toward containerization mean to the mechanical department? It could have an important influence on the kind of cars that may be needed. And the probability that container car traffic must be moved at high speed is another reason why high-horsepower motive power should be acquired.

Piggybacking caught many railroads napping with the result that hundreds of standard flat cars, cars not designed for the service, had to be converted as an expedient. Mechanical department officers should keep ahead of this containerization development and be prepared to meet any demands it may place on their rolling stock.

Filling a Void

New developments with railroad applications occur so rapidly that the average railroad man can do little more than keep abreast of them. Railroad associations do much to record and appraise the value of new things. But it is regrettable that associations fostered by the railroads need curtail their work because of economy measures. It is also notable that at least one other association is increasing its functions for the benefit of railroads.

This is the Land Transportation Committee of the American Institute of Electrical Engineers. At its last meeting held in New York, Jan. 31-Feb. 2, it produced papers to indicate much progress in the field of railroad transportation. For example, one showed that signals to control locomotive operation can be transmitted over tracks and that by means of an analog computer such signals may cause the locomotive to operate over a varying profile as if controlled by an engineman. Another showed how the several manufacturers of the highly effective epoxy resins can produce any required type of resin to match the needs of railroad service. Still another showed how it is possible to make up a package study to predetermine, with some degree of accuracy, the advantage a railroad might obtain by the use of electric traction. A diesel-electric locomotive with minimum gadgetry was described which was designed with a slogan, "If it isn't on there, it can't fail" in mind.

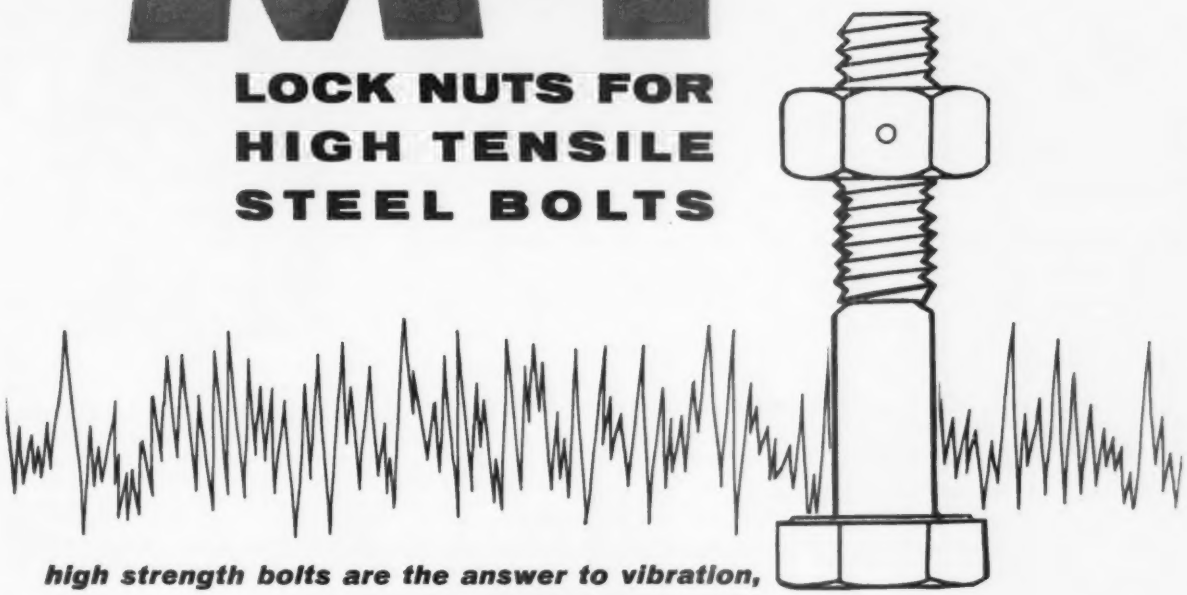
Among several contributions from foreign countries was one describing the use of a single traction motor, geared to both axles of a two-axle truck on a car or locomotive. This practice, it is claimed, will increase adhesion 50 per cent as compared with a similar truck having its axles driven separately by two motors. Several foreign countries employ silicon-type rectifiers to replace mercury-arc rectifiers on cars and locomotives. These are desirable because of their small size and simplicity, but are looked upon skeptically because of possible failure which may be caused by over voltage or current peaks. Listeners were assured that these difficulties may be overcome in rather simple fashion and an American railroad has declared its intention to use them.

It was one of the largest meetings this committee ever held and it included more than the usual percentage of railroad men. The significance of the situation appears to be that in a free economy (and we sincerely hope that ours is indeed free) a vacuum is always filled. When a need is created arbitrarily or by circumstance—someone or something always takes care of it.

The AIEE Land Transportation Committee can not function as an official railroad organization but it can probably do better with subjects concerning design and manufacture and with some forms of practice.

M·F

LOCK NUTS FOR HIGH TENSILE STEEL BOLTS



high strength bolts are the answer to vibration, only when properly secured!

Load capacity is your only concern with static assemblies, but with dynamic loading, vibration starts rivets rattling, loosens washers and ordinary fasteners!

The M F *deflected thread* locking principle is the *proven safe* and economical mechanism for high strength bolts!

The AAR requirement of "...self-locking fasteners and high tensile steel bolts for securing air brake equipment to new and rebuilt freight cars in interchange" specifies suitable self-locking nuts for specific locations.

THE M·F UNI-TORQUE LOCK NUT ®

THE M·F TWO-WAY LOCK NUT ®

Your requirements should specify M F deflected thread UNI-TORQUE or TWO-WAY *prevailing torque* lock nuts, proven by many years of on-the-line *railroad* service, not only for absolute safety, but for absolute economy!

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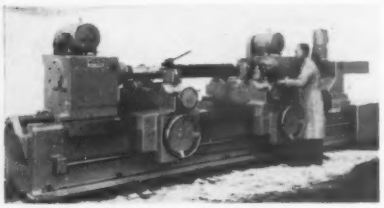
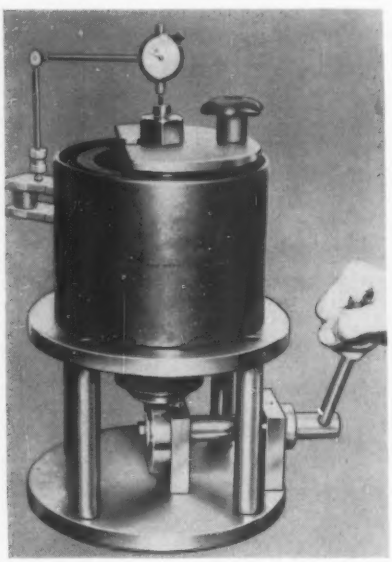


Journal Truing and Axle Lathe

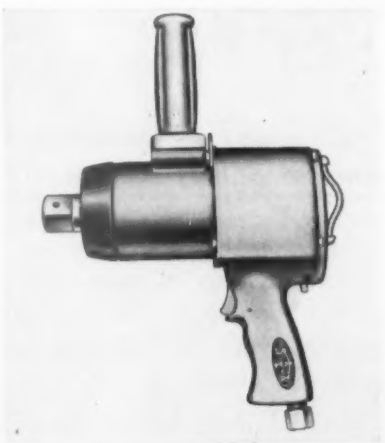
The Farrel-Sellers dual end-drive lathe will rough turn, finish turn, and burnish either new or used car or diesel axles in standard AAR sizes from 3¼ in. x 7 in. up to and including 6½ in. x 12 in. It will turn and burnish inside journals of mounted wheel sets with tread diameters up to 46 in., and turn center portion, between wheel seats, of either straight or tapered axles.

The lathe has a swing of 49 in. over the 17-ft 8-in. bed. Swing accommodates a wheel tread diameter of 46 in. Center height is 46¾ in. from floor line. *Farrel-Birmingham Co., Consolidated Machine Tool Div., Dept. RLC, 565 Blossom Road, Rochester 10, N. Y.*



Lateral Checking Fixture

A set of OTC tools, designed in cooperation with the Timken Roller Bearing Co. and approved by them and the Hyatt Bearing Div., General Motors Corp., determines the correct bearing bench lateral play and permits proper lubrication of freight-car roller-bearing assemblies. The tools are used after bearing assembly has been completely disassembled, degreased, and necessary maintenance performed or parts replaced. As reassembly begins, the Lateral Checking Fixture determines the correct amount of bearing bench lateral play which will allow corrective action to be taken if the lateral play is not within the limits specified. One bearing cone is then greased with the Bearing Cone Greaser and inserted into the outer bearing cup. Next, the cone spacer is inserted into the outer bearing cup and lubricated with the Cone Space Lubricator. Finally, remaining bearing cone is greased wtih Bearing Cone Greaser and inserted into the outer bearing cup. *Owatonna Tool Co., Dept. RLC, 679 Cedar st., Owatonna, Minn.*

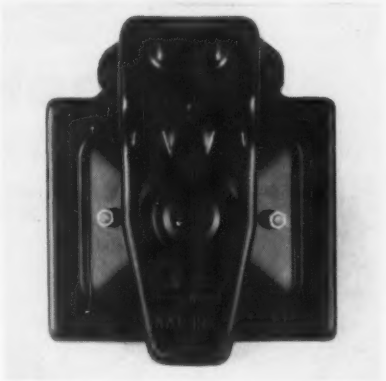


Air Impact Wrench

The Sioux heavy duty 1-in. square drive No. 482 air impact wrench features a new and improved air motor and housing. Air entry is through a ½-in. inlet. With more air moving at higher speeds, the wrench accelerates rapidly for faster rundown. The reversing valve with related volume control for right-hand operation is leakproof, and bails provide for horizontal or vertical suspension. An auxiliary, adjustable handle can be moved to four positions. *Albertson & Co., Dept. RLC, Sioux City 2, Iowa.*

Journal-Box Lid

Journal-box lids, Types 170 and 171, of heavy-gage pressed steel, with easily replaced seals, have a constant pressure compression spring which provides maximum seating surface and range of deflection on the journal-box housing. The lids have four-way articulation, an extended housing arm to facilitate raising, and a 120-deg opening for installation and service. Seals



of neoprene closed-cell rubber skin are held tightly against the lids by a solid stamped retainer plate fastened at two points by standard bolts, lock washers and nuts. In combination with the 40 to 65 lb per sq in. lid pressure, a complete seal is formed with the face of the journal box, keeping moisture and dirt out and oil in, and eliminating vibration and shock.

One road has over 1,500 70-ton hopper cars equipped with the lid which has been certified by the AAR. Type 170 (Part No. 3372) fits both 5- x 9-in. and 5½- x 10-in. boxes. Type 171 (Part No. 3354) fits 6-x 11-in. boxes. *Motor Wheel Corp., Dept. RLC, Lansing, Mich.*

Grain Door

Six- to 9-ft doorways, it is said, can be covered with a new grain door without special harness or extension bands. The door center post is reinforced by a tension cable which connects grain doors on each side of the car. This minimizes bulging and blocking of storm doors and permits easy inspection. Coopering can be completed in half the time required by other types of doors and with fewer hazards because of steel straps. Regular roofing nails pinion the door to the side walls.

Although the door can be cut for unloading, reinforcing glass scrim in the heavy kraft paper prevents the spreading of small rents or tears occurring in transit. According to the manufacturer, cars can be stripped for reloading in 5 min without special tools.

For 3½ years the door was tested on long hauls, often with over 110,000 lb of grain. During the tests, grain loss due to failure of the door was said to be less than 1%. *Bemis Bro. Bag Co., Dept. RLC, 408 Pine st., St. Louis 2, Mo.*

Graphite Lubricant

Mexacote is a quick-drying lubricant compounded from a blend of fine Mexican graphite and special oils. It is non-toxic and has been specially formulated for use on springs, buffer assemblies, center plates, pedestal jaws, and liners. When thinned with turpentine, naptha, or oelum spirits, the lubricant is easily applied by brush, swab, or spatula. It is packaged in 1-gal cans. *United States Graphite Co., Div. of Wickes Corp., Dept. RLC, Saginal, Mich.*

Journal Jack

The Speedmatic air-operated empty car journal jack is balanced for easy movement and designed for application and removal of bearings and lubricators. It can be used on paved or unpaved repair tracks and placed under the journal box at any desired angle. The manufacturer claims it reduces present hand jacking labor costs 50%. *Western States Supply Co., Dept. RLC, 1517 Harney st., Omaha 2.*

Engine-Water Temperature Regulator

The 1012-EMD engine-water temperature regulator, for application to 1,000 - 1,200-hp EMD switchers is self actuated, requiring no air or electric power. Because of modulating control, wide variations in water temperature are prevented. Its light weight requires no bracing, and less than 8 man-hours, it is said, are needed to replace the existing cast tee.

The regulator, installed in the space vacated by the cast tee, will vary the flow of water through the radiator from zero to maximum. Water below 160 deg all flows to the bypass. Above 180 deg, all flow is to the radiator. Between 160 and 180 deg, there are many variations of flow through

the radiator. Water temperature, therefore, is seldom below 160 and never above 180 deg. Shutter control is adjusted to open at 175 deg. F. *Ogontz Controls Co., Dept RLC, 8029 York Road, Philadelphia 17, Pa.*

Low Temperature Insulation

Cellofoam low-temperature insulation is a closed-cell, rigid, expanded polystyrene product having a density of 1.0-2.0 lb per cu ft. It is available in regular and self-extinguishing forms. Maximum length is 12 ft 4 in.; widths, 12, 16 and 24 in., and thicknesses, ½ through 8 in. Tested at a mean temperature of 40 deg F, the insulation is said to have provided a thermal conductivity (k) value of 0.22 Btu per hr per sq ft per in. per deg F. It is said to possess high bond strength for finishing applications and to have excellent resistance to impact and compression loads. It may be applied to wood and steel surfaces subject to operating temperatures as low as minus 60 deg F. *United States Mineral Wool Co., Dept. RLC, Stanhope, N. J.*

Outdoor Vacuum

The Blow-Vac outdoor vacuum Model Y-3 is specially designed for picking up waste paper and other refuse. Its front wheels, mounted on nozzle for easier operation especially on uneven ground, adjust to three positions. The semi-pneumatic rubber tires on the rear wheels are 10 in. diameter. The 30-in. x 4-in. nozzle is welded directly to impeller housing. Power is furnished by a 3-hp, 4-cycle Briggs & Stratton gasoline engine, and speed is controlled from the handle bar. Fuel tank holds ¾ gal. *Outdoor Vacuum Div., Wheel Truing Brake Shoe Co., Dept. RLC, 628 W. Baltimore ave., Detroit 2, Mich.*

Rust Remover

Alkaline rust remover is a non-acid, non-flammable product that removes heavy rust and stubborn paint deposits by means of a one-tank operation followed by a pressure rinse. It contains no cyanide compounds and is said to emit no corrosive fumes. When used in a soak tank or electrolytically, the remover requires a welded, mild-steel hot tank with stainless-steel heating coils. Metals withdrawn from the process require no after-neutralization. *Turco Products, Inc., Dept. RLC, 24600 South Main st., Wilmington, Calif.*

Mercury Vapor Floodlights

The Spreadliter, a wide-beam mercury vapor floodlight, features uniform distribution without hot spots; full 18-in. parabolic Anadol finished aluminum reflectors which avoid trapped light, and fin-cooled aluminum socket housing. No tools are required for cleaning and lamp changing. Combination pole top floodlights with ballast are available as a complete package, and floodlights for remote ballast mounting are available in wall, crossarm, pipe clamp, and pole top types.

Color corrected 1,000 lamp types with ribbed lens have beam spreads of 164 deg horizontal, 120 deg vertical. Clear lens types have a 96-deg circular beam pattern. Types of 400 watt with ribbed lens have beam spreads of 163 deg horizontal, 101 deg vertical. Clear lens types have an 89 deg circular beam pattern. All types are especially adapted for railroad yards, loading docks, etc. *Steber Div., Pyle-National Co., Dept. RLC, 1334 N. Kostner ave., Chicago 51.*

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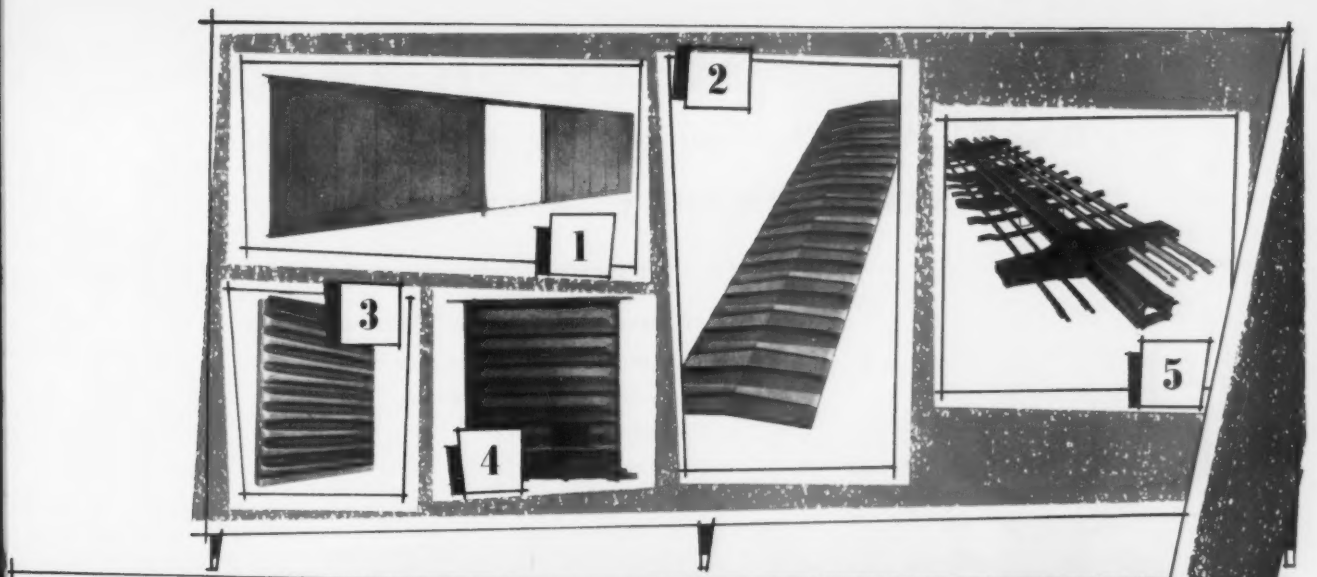
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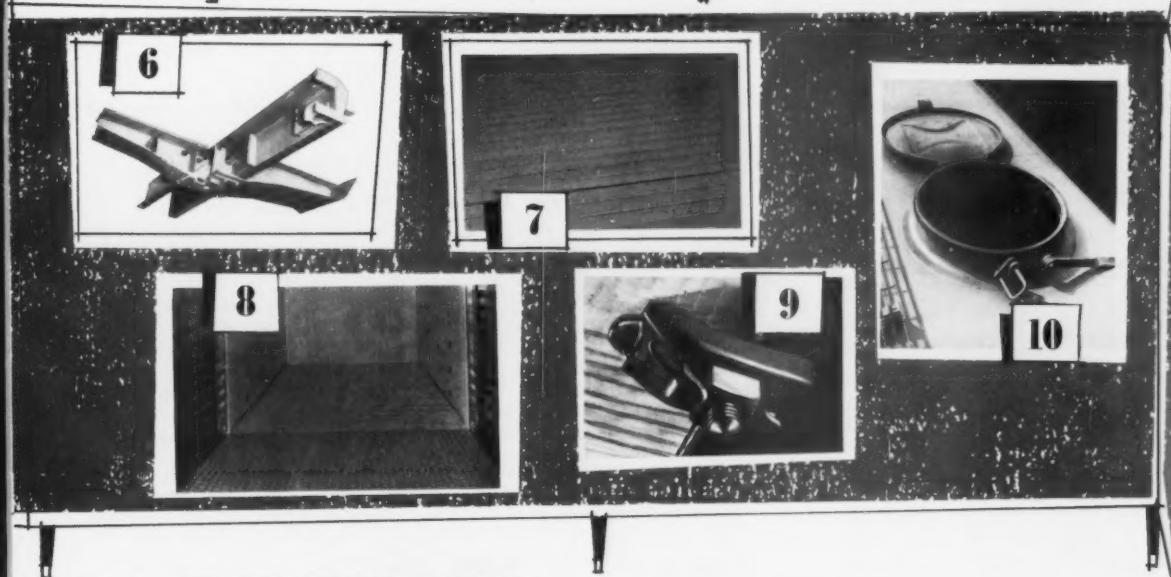
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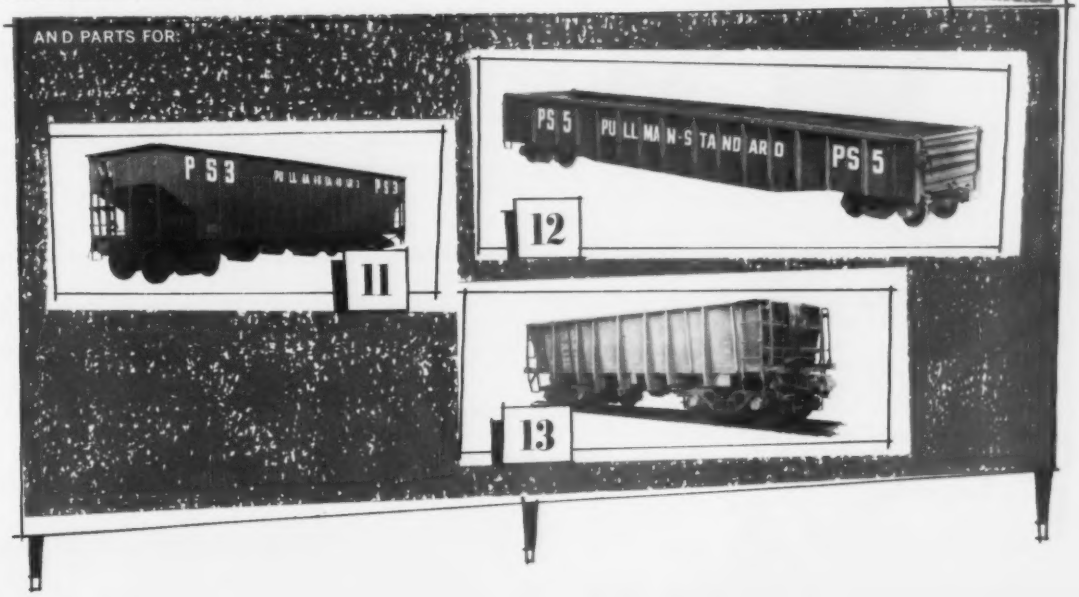
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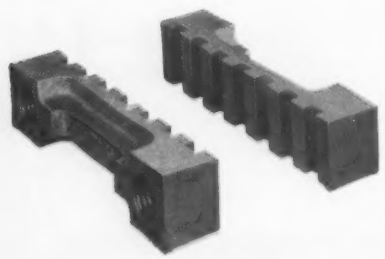
STABILIZED JOURNALS—

Now MAGNUS offers you three low-cost ways to get

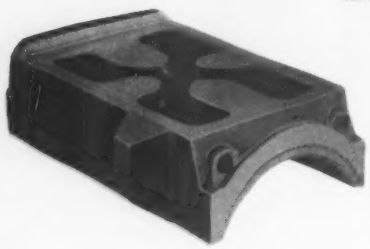
BETTER BEARING PERFORMANCE



1. MAGNUS R-S JOURNAL STOPS

Provide maximum stabilization of entire journal box assembly—increases miles per hot box ten times

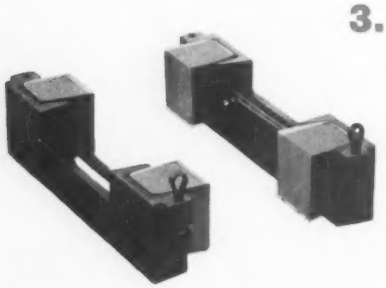
Bolted to the inside of the box, on both sides of the journal, Magnus R-S Journal Stops positively prevent excessive displacement of bearing, wedge or lubricator pad, even under severe humping, braking or road impacts. By stabilizing the entire journal bearing assembly they eliminate the major causes of bearing failures—increase miles per hot box *ten times;* miles per cut journal, *fifteen times!* In short, they cut maintenance and operating costs all along the line—double bearing and dust guard life, reduce wheel flange wear, extend the maximum safe period between repacks.



2. MAGNUS FLAT-BACK SOLID BEARINGS

Wider, non-tilting design limits bearing displacement—provides effective stabilization at lower cost

The Magnus flat-back bearing design provides the most economical means of stabilizing the journal box assembly, and has proved highly effective for many types of service. Its greater width, increased angle of journal contact and full-area contact with the flat wedge inherently limit the fore-and-aft movement of the journal within the box under road shocks and switching impacts. This restriction of movement protects the dust-guard, reduces loss of oil through enlarged dust-guard openings and tends to prevent spread linings in the bearing.



3. MAGSTOPS

Offer the inherent advantages of R-S Journal Stops in a low-cost, rugged, fabricated design

Here's a new approach to the problem of journal box stabilization—a low-cost fabricated journal stop with forged steel frames and renewable bronze inserts that hold the journal in the center of the box even under the most severe car impacts. The frames are welded to the inside of the journal box and need never again be removed. Wear occurs only on the brass inserts, which are easily and inexpensively replaced during wheel changes, without any special tools.

The next big step toward better bearing performance will be the adoption of effective means of stabilizing the journal assembly—for this is the most economical way to reduce hot boxes. Magnus, the pioneer in journal stabilization, now offers you *three ways* to achieve this result at low cost. All have been approved by the AAR for test installations in interchange service. Ask your Magnus representative to discuss with you the most effective solution to this problem. Or write to Magnus Metal Corporation, 111 Broadway, New York 4, or 80 E. Jackson Blvd., Chicago.

MAGNUS METAL CORPORATION

Subsidiary of

NATIONAL LEAD COMPANY

Cars are operated on this test track in the course of impact experiments which are determining the effectiveness of draft gears.

AAR Research Studies Draft Gears

Cushion underframes, wheels, and journal lubrication are also under investigation for Mechanical Division

Draft-gear investigations have recently been an important phase of AAR Mechanical Division research. This research is carried on at the AAR Research Center in Chicago. Wheel and axle investigations are among the other activities which were important assignments of the Research Center technical staff last year.

The Research staff is currently making a complete review of sliding center sills. It is planned to set up standards to control the installation and maintenance of the various types now in interchange.

Extensive tests have been made on the standard-pocket draft gears to determine the actual performance of eleven types under controlled impacts. Included were two rubber-friction type gears, one high-capacity friction type, three rubber gears, and five standard friction gears. Stresses developed at critical points in the underframe and body bolsters and during impact were measured with SR-4 strain gages. Forces in the dynamometer couplers and measurements of gear closure were obtained electronically.

A special electronic gage mounted on the draft-gear carrier iron at the lower center of the draft-gear pocket was used to record gear travel in relation to peak forces. In addition, a mechanical travel gage, mounted parallel with the electronic gage, measures maximum gear travel to 0.01 in.

A new instrumentation system for measuring draft-gear reaction forces has been installed in the Research Center testing machine used for draft-gear tests. The recording oscillograph delivers complete record within seconds following measurement of the force by a load cell transducer. Recently revised AAR draft-gear specifications M-901-D and M-901-E make reaction forces a governing factor. Draft-gear capacity is now established at a point where a 500,000-lb reaction force is obtained.

An additional requirement of the new specifications is successful completion of actual service tests before final approval is granted. After two years of road service, gears are inspected at the Research Center and

Oscillograph for recording draft gear impacts on outdoor test track is located in an instrument room and is controlled remotely from the test track site.

subjected to capacity tests for comparison with original performance.

During the past year over 100 gears were installed in 70-ton hoppers, refrigerator cars, high-capacity box cars, new tank cars, and covered hoppers as part of these AAR check test requirements. Twenty-three car sets of gears were removed from service as part of the inspection program. Two gears have been given unconditional approval. An additional 100 gears await completion of AAR approval tests for actual service installations.

Friction gears removed in the service check test program are being investigated to determine if rusting causes loss of capacity. New gears were calibrated and placed in a humidity chamber where rust was induced with live steam. Appreciable loss in capacity is found when a heavy coating of rust occurs after the gears are shipped and before the friction plate wears in and cleans the rusted area.

Excessive wear of F-type interlocking freight-car couplers is under study by the AAR Coupler and Draft Gear Committee. Jackknifing of the coupler at the rear ball and socket joint can cause the rear of the yoke and the gear carrier to wear and deflect excessively. A new supporting arrangement, including a second support plate, may correct this condition.

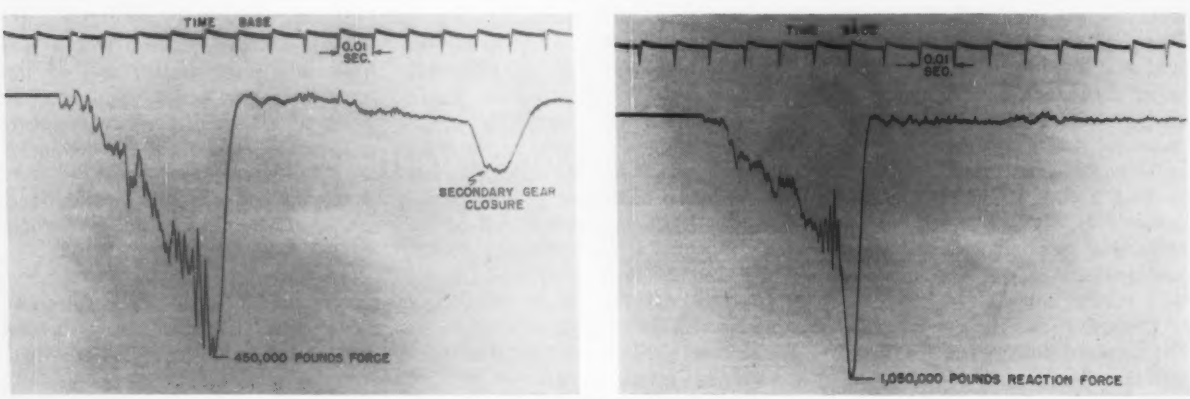
Studies being made on the raised wheel seat "as-forged" body freight-car axles and journal area of roller-bearing axles have been accelerated, with the full scale fatigue machines operating on a 24-hr basis. An enlarged program of strain gage and fatigue testing of diesel locomotive axles was started in 1960. In addition to the three diesel axles already tested, twelve additional axles are under test. Along with the rotating fatigue tests, static strain gage tests were made both when the mounting wheel was pressed on and when the static bending load was first applied in the fatigue machine.

Experiments have been made with gages on the wheel seat to obtain stress curves in relation to wheel positions when the wheel is pressed on. Static bending tests on a diesel axle having strain gages mounted along the body length indicate possible stress concentrations near the root of the 1½-in. radius fillet between the gear seat and the motor bearing area of the axle body.

Diesel axles tested in rotating fatigue have, until now, had the mounting wheel on the gear seat end and there has been no gear on the axle. Failures have occurred in the axle wheel seat inside the wheel bore. Four axles tested as of September 1960 were stressed below 14,500 psi and above 16,900 psi. There were no failures below 14,500 psi. Complete breaks occurred above 16,500 psi. Sufficient data is not yet available for establishing endurance limits.

The study of stresses in plates of diesel locomotive wheels has been completed. Results obtained by a series of "stop" tests run on a regular production A-40 wheel and a specially machined A-40 wheel show no large difference in the stress levels. The maximum difference was less than 20% and the average difference considerably less. The machined wheel tends to be stressed to a higher level at the outside hub fillet location. It is stressed to a somewhat lower level at the inside rim location as compared to the standard production wheel.

Studies were made of the journals on two idle tank cars to determine effects of corrosion. Three inhibitors blended with journal-box oil were tested. Damage after eight months



Reaction forces recorded by AAR oscillograph show the effect of the free fall of 27,000 lb drop hammer tup on friction draft gear.

was severe; the corrosion was not significantlly reduced by any of the inhibited lubricants. Another test on passenger-car journals showed the same corrosion results. Tests are being made at the Research Center on the journals of two assembled freight-car trucks lubricated with various combinations of journal-box oil and corrosion inhibitors. Over 25 inhibitors have been screened in the laboratory. These include amines, petroleum sulfonates, volatile or vapor-phase corrosion inhibitors, organic phosphates, and naphthalene compounds. To date, a satisfactory corrosion inhibiting additive for the journal-box lubricants has not been found.

Roller-bearing greases are being studied to determine the effects of moisture in greases and the corrosive tendencies of these "wet" greases. Revised AAR grease specifications include a test for the evaluation of corrosion-inhibitive properties under humid conditions. This test, published by the Coordinating Research Council, is being used to re-evaluate all roller-bearing greases which have previously been approved for use in interchange.

Tests to extend the relubrication period of roller bearings show that grease does not deteriorate in structure, nor lose its lubricating effectiveness after service periods of three, four, or five years without relubrication. Roller-bearing grease seals have been found adequate to retain sufficient lubricant for these periods.

Development and construction of new laboratory equipment for better evaluating performance and characteristics of lubricators and other parts of the journal-box assembly are continuing. As of January 1, 1961, eleven lubricators have received conditional approval. More stringent specifications, in effect since last year, required considerable supplementary investigation, the repeating of certain basic tests, and some alterations in the laboratory machines and equipment.

Tests of oil-feed properties of waste and lubricators are continuing. These involve removing the oil fed by the lubricating medium from the rotating journal surface for weighing. Radioactive phosphorous-32 has also been dispersed in the journal-box oil to study these feeding characteristics and to establish the paths of oil flow through the lubricator system. A Geiger tube placed close to and parallel with the journal surface was used to detect the amount of radioactive material and, consequently, the quantity of oil being carried on the journal. Preliminary tests have shown a definite pattern of circulation.

Corrosion of the journals of standing cars equipped with solid bearings is being investigated. Corrosion inhibitors for roller bearing lubricants are also under test.

Tests of a hot-box indicator continued during 1960. Five railroads participated in determinations of the effectiveness of the device under actual service conditions. The indicator consists of a copper tube placed in the dust-guard well which contains titanium tetrachloride for the production of smoke, and butyl mercaptan for odor. These materials are combined with a pressurizing agent to improve release through small apertures in the tube as the proper temperature is reached.

Brake Lubrication

A new lubricant to improve the performance of AB valves by reducing incidence of stuck brakes has been recommended for road service tests. In laboratory tests, both AB service and emergency portions passed the rack test with the special lubricant after 97,800 brake application and release cycles in temperatures ranging from 130 deg F to minus 45 deg F. It was necessary to discontinue tests using the present M-912 valve oil after 46,230 cycles because of frequent undesired emergencies. After lubricating this valve with the special lubricant, it operated 51,480 cycles with no emergency applications.

Studies are continuing on improvements in the mechanical parts of AB valves. Several valves, modified by replacing the pistons in the emergency portions with rubber diaphragms, have been applied to captive cars for field test. Studies show it is feasible to modify the service portion in a like manner.

Tests were made to evaluate the corrosion rates of various grades and heat treatments of cast iron. Malleable iron was tested relative to ductile iron and pearlitic malleable iron. Tests were conducted under high humidity conditions with periodic immersions in water and brine. Several primers and coatings have been evaluated for possible application to freight-car structural parts. An epoxy-tar coating was found to be quite effective in brine immersion tests.

Studies made on diesel fuel filters make it desirable to rate the filter media on the basis of AAR pore size, contaminant holding capacity, and total external filter surface area. Final tests were made last year with a set of pleated paper elements made from phenolic resin impregnated paper having a mean flow pore size of 16 microns. The pleated paper elements were found to have a similar degree of filtration comparable with previous tests run on cotton-sock elements, but the pleated paper had much greater life. The Committee on Locomotives and Locomotive Fuels is preparing a specification for discharge oil-filter elements. The specification would establish maximum and minimum valves of the physical properties of the filter element and would not be dependent on laboratory performance tests.

NYC Young

Tools and repair parts are stocked along each repair track, convenient to work "spots."

Mechanized freight-car repairs, plus complete car-cleaning facilities, are important in the operation of the New York Central's Robert R. Young electronic yard at Elkhart, Ind. During a recent typical period, an average day saw 60 cars receive light repairs; 10 to 16 NYC cars were upgraded under a planned two-shift repair program, and 150 cars were cleaned, repaired and carded on the cleaning tracks.

The car-repair area operates continuously with four carmen on each of the three daily shifts assigned to two "fast" tracks. An average of seven men work two shifts, five days a week, on the upgrading and heavy repair tracks. Three of the four repair tracks extend through a 120-ft prefabricated building. Two of these are the pair of "fast" tracks. Their uninterrupted, all-weather operation is important in the overall operation of the Robert R. Young yard.

Bad-order cars are placed on lead tracks to the repair shed. After inspection by foremen to determine exact repairs, these cars are brought into the working area by a Trackmobile. Track 1, north of the shed, is assigned for repairs to heavily damaged cars and cars requiring adjustment of loads. It is equipped with a 200,000-lb guillotine-type load adjuster, which is used for shifting loads longitudinally. Loads can be shifted transversely by jacking against the main frame of the adjuster. Some 90 to 120 adjustments are made each month. Carmen from the wrecking crane force do this work. Track 2, under the shed and equipped with a permanent A-frame and portable jacks, is frequently used for upgrading NYC box cars. This includes new flooring when needed.

Tracks 3 and 4, the fast tracks, are equipped with permanent A-frames and Duff-Norton electric jacks, one on each side of each track. Two carmen are assigned to each track. Wheel changes, coupler and draft-gear repairs, AB brake cleaning, repacking, and all other light repairs are made. Infra-red heaters are used at work locations during inclement weather.

Materials are convenient to the repair areas. Wheels, draft gears, couplers, and other heavy components are delivered by materials-handling trucks. Two complete sets of overhead reels on each of the three covered tracks supply journal oil, journal-box cleaning solvent, air, and welding current. Storeroom, office, and shop buildings are adjacent to the repair shed. These include an oil room with lubricator-pad renovating machine, wheel shop for journal work only, air-brake room, wood mill, compressor room, and boiler room.

The wheel shop turns journals on 8 to 10 pairs of wheels per shift. The machinist, on duty in the wheel shop for at least one shift daily, is also responsible for repairing and maintaining shop equipment—the Trackmo-

Wheel storage is adjacent to the machine shop which is in building containing other work areas, locker rooms, and offices.

Sheltered repair area has capacity of six cars. Wind breaks have been built between tracks at far end of the building.

Yard Has Spot Repair System

bile, two 3-ton cranes, two fork-lifts, one shop truck, one front-end loader, one tractor, and three highway trucks. The air-brake room is a two-shift operation and is equipped to clean and assemble 450 brake-cylinder pistons per month. This quantity supplies not only the Elkhart working areas, but also repair facilities at Toledo and Stanley, Ohio, and Kankakee, Ill. Pistons for reclamation are shipped in on metal pallets in groups of nine and returned the same way.

Typical Repair Force

Shifts	1	2	3
Foremen	1	1	1
Foreman (wreckmaster)	1	–	–
Piston assembly repairman	1	1	–
Machinist	1	1	–
Carmen	11	11	4
Carman helper	1	1	–
Painter	1	–	–
Truck operator	2	2	2
Laborer	1	–	–

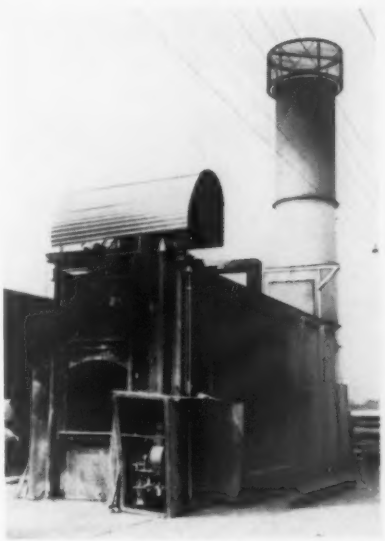
Typical Monthly Production

Car-servicing area:	
Cars repaired	1,890
Cars repacked	315
Wheel sets processed	584
Air brakes cleaned	122
Car cleaning area:	
Cars steamed and washed	938
Total cars cleaned	3,445
Cars repaired	1,151
Cars upgraded	157
Stock cars cleaned and bedded	183

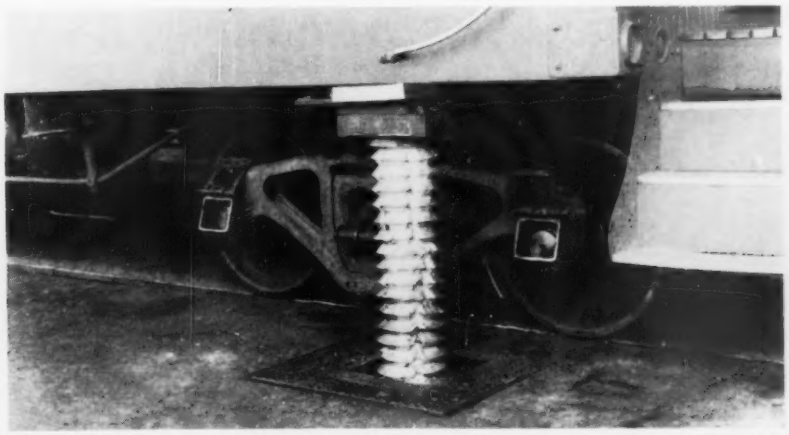
The car-cleaning area, adjacent to the westbound departure yard and some distance from the car repair area, consists of two tracks each holding approximately 40 cars. There are supporting buildings for wash and locker rooms and material storage. The cleaning tracks are switched twice daily. Cars delivered to the cleaning track leads by yard locomotives are moved on and off the cleaning area by car pullers at the ends of each track. The force recently consisted of one foreman, six carmen, nine laborers, and two truck operators. Five carmen were doing upgrading and one was responsible for inspection and repair of safety appliances. Before the cars are moved from cleaning track, they are inspected, carded for commodity classification, and selected for upgrading.

Equipment in the cleaning area includes a crane, fork-lift, tractor, and front-end loader. Burnable material is swept from cars into dumping containers which are handled by the fork-lift to the incinerator. Gondolas are spotted on two stub tracks for incombustible scrap. Upgrading may involve repairing "in kind," or the use of plywood and paper liners. When weather permits, cars are washed. A Vapor upgrader is used to clean cars previously loaded with lime, cement, or lamp black. Stock cars are cleaned on only one of the two tracks. Refuse is shoveled into bins as these cars are moved into cleaning area. After cleaning, cars are sanded and bedded by laborers using front-end loader.

Lubricator pad cleaning machine can process a load of eight journal pads in 15 min.



Incinerator at cleaning track is used for disposing of combustible trash from cars.



Electric jacks are permanently installed on the two "fast" repair tracks. Car repair facility has been in operation since Young Yard was opened in 1958.

Oil tank with 12-volt pump and 275 gal capacity is used for journal oiling in train yard.

New GP-20's speed freight on the UNION PACIFIC

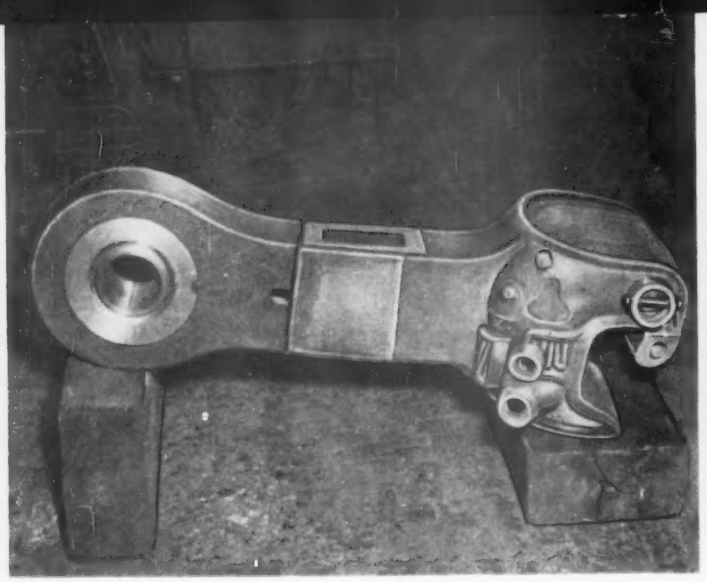
Thirty new General Motors GP-20's are speeding crack Union Pacific freight trains westward from Council Bluffs to Ogden, Utah. Used on expedited freight service across the plains, new 2000-hp GP-20's are averaging 15,000 unit miles per month. Added capacity enables three Electro-Motive GP-20's to replace four older locomotives. 61-R-6

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

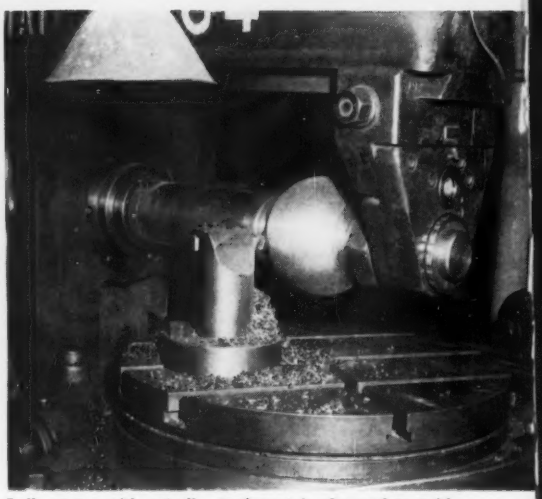
LA GRANGE, ILLINOIS • *HOME OF THE DIESEL LOCOMOTIVE*

In Canada: General Motors Diesel, Limited, London, Ontario

GENERAL MOTORS LOCOMOTIVES

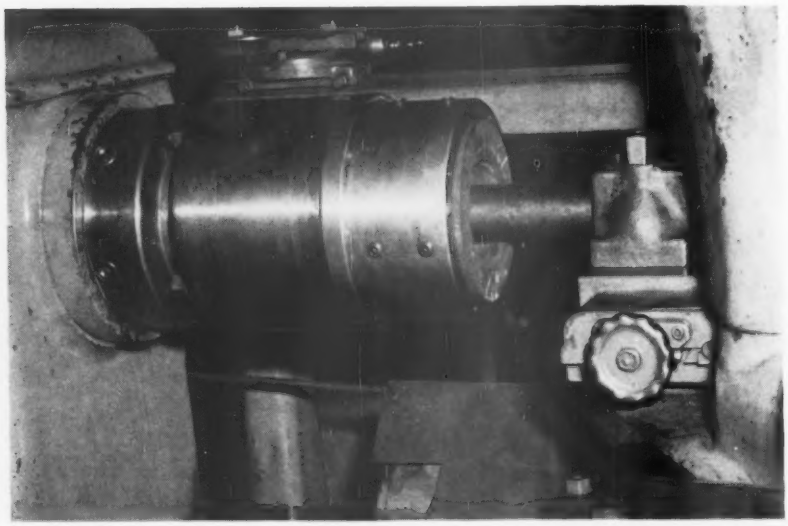


Completed ball and bushing assembly is pressed into coupler ready for service.



Ball rotates with spindle; tool post is clamped to table.

Coupler Reclamation at L&N Shop

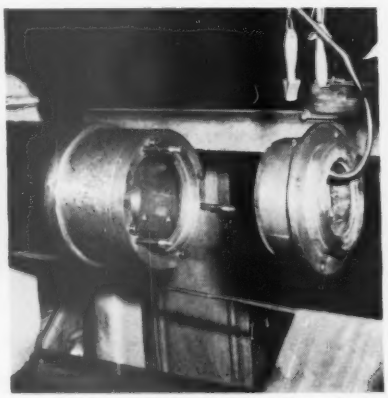


Tracer template (upper left) has contour for the machining of the proper radius on bushings. Bushings are machined to two oversizes. Entire process has proved to be economical for L&N.

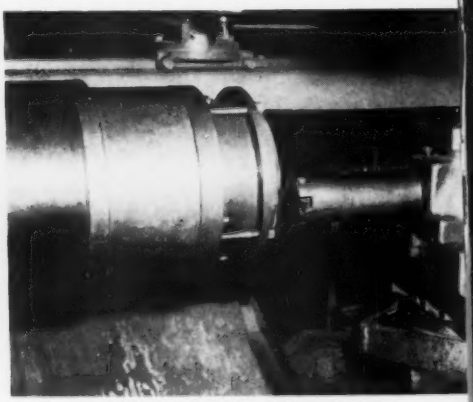
Complete spherical coupler bushings and balls both for type E and H couplers are manufactured and worn bushings reclaimed to two oversizes at the South Louisville, Ky, shop of the Louisville & Nashville. The reclaimed bushings are rebored to a maximum diameter of 6⅞-in. for the second oversize, and new balls are made to suit either oversize. This arrangement enables the railroad to get three two-year cycles of service with the standard ball and bushing and the two oversizes of each.

The split bushing is positioned and rebored in a fixture attached to the spindle nose of a Monarch air tracer lathe. The balls are drop forged. They are then faced, bored, and the sphere generated in a Cincinnati No. 5 milling machine.

Worn bushing mounts in fixture with set screws.

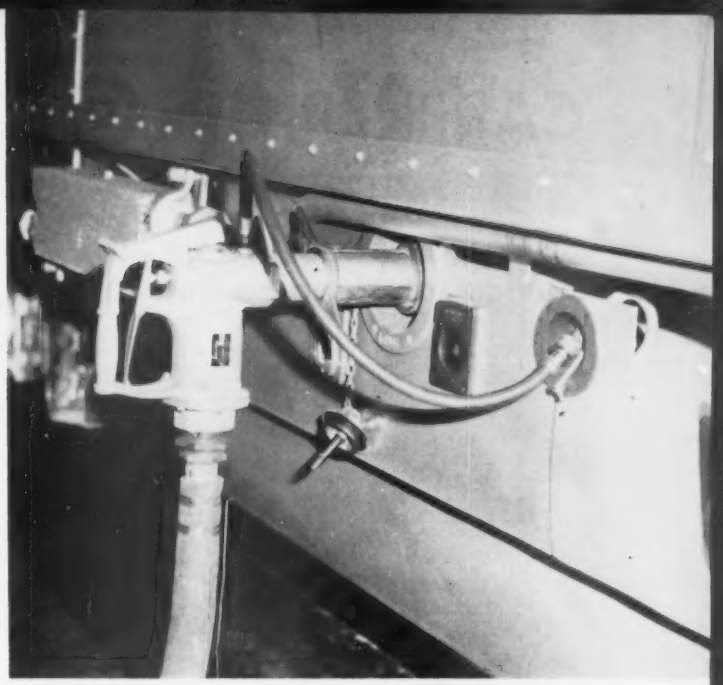


Assembly is moved to mating fixture on lathe.



Tool cuts locking ring and packing groove.

Automatic System Simplifies Fueling for Rio Grande



Fueling nozzle is connected to locomotive's filling tube, sensing line is attached to the quick-coupling fitting which transmits tank level indication, and the nozzle handle is moved to the open position. When tank is filled, the nozzle will shut off automatically.

An automatic shut-off fueling system, developed over two years ago on the Denver & Rio Grande Western, is now standard on the road. A number of installations have been made; all locomotives passing through Burnham shop at Denver are being equipped.

A. N. Bisgard, assistant chief mechanical officer of the D&RGW, was one of the designers. The system is marketed by the B. K. Sweeney Manufacturing Company.

The system is designed for application to all types of diesel locomotives. It requires no alteration of the locomotive filler tube or fueling station connectors. The standard Protecto-Seal couplings are retained. The adaptor applied to the fuel tank measures the level and, when it is full, the nozzle shuts off automatically. A 90-deg elbow applied near the top of the fuel tank is connected by a flexible hose to a quick-coupling housing mounted on the locomotive skirt. A separate mounting plate is provided for locomotives without skirts.

How It Operates

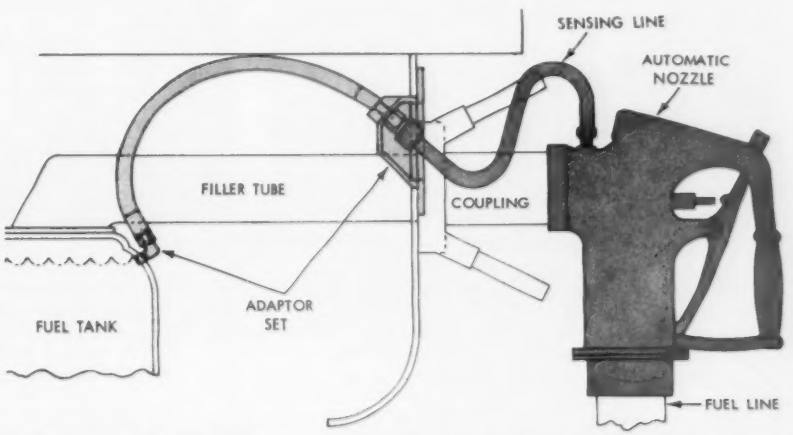
Prior to operating the system, the automatic action of the nozzle can be pretested. After the nozzle is connected to the filler tube, the trigger is pulled to start flow of fuel into the tank. Before the sensory line is connected to the quick-coupling, the operator places his thumb over the sensory line orifice. The nozzle will shut off when the orifice is closed. The sensory line is then connected to the housing and the trigger pulled to start the fuel flow. As long as air passes through the connected sensing lines between the fuel tank and the nozzle, the fuel will continue to flow.

When the fuel level in the tank reaches an orifice in the 90-deg elbow, air in the sensing line is cut off, tripping the valve in the nozzle and stopping fuel flow. The trigger position on the nozzle signals the operator that fueling is completed.

Sweeney automatic shut-off nozzles are available in 1½-in. and 2½-in. sizes. Maximum flow rates are 300 gpm for the 2½-in. size and 75 gpm for the 1½-in. size. Minimum rates are 30 gpm and 25 gpm, respectively. The 2½-in. nozzle can be set at "soft-close" to eliminate line shock when pump pressures are high and fuel supply lines are long. This feature can also be used to over-ride the control and add fuel above the orifice, completely filling the tank.

When the Sweeney nozzle is used for conventional manual filling, it is shut off by tripping a lever on top of the handle. The automatic nozzle can fuel locomotives not equipped with the fuel-tank adaptor sets. A conventional nozzle can be used to manually refill Sweeney-equipped locomotives. Average installation time of a fuel adaptor set on one side of a locomotive is approximately 2 hr.

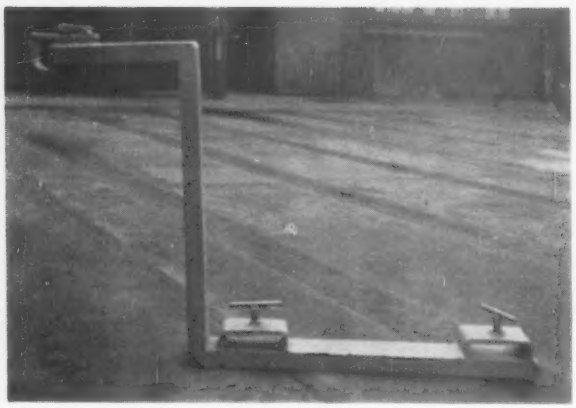
Applications on the Rio Grande at Denver include a four-nozzle fueling station at Burnham and four fueling points at the north yard plant in Denver. Officers of the road anticipate a substantial saving because of elimination of fuel-tank overflow. Locomotive servicing time can also be reduced.



Typical installation of the Sweeney automatic fueling system on a diesel road unit is shown in this diagram. Adaptor unit is mounted on special bracket when locomotive has no skirt.

CAR REPAIR TIME-SAVERS

Device for Hanging Box Car Doors



To expedite the hanging of box car doors, reduce manual labor and avoid any hazard in this somewhat difficult operation, a jig has been developed by the Brooklyn, Ore., shop of the Southern Pacific. A somewhat reinforced design is now used at other car shops on the system.

The device, used in conjunction with a fork-lift, is made of a 4-in. channel formed at the corners and carefully welded to assure full strength with a good factor of safety. The upper horizontal leg is 12¾ in. long, the vertical leg 24¾ in. long and the lower horizontal leg which engages the lift-truck fork ends, 30 in. long.

Two brackets with substantial ⅝-in. hand screws for tightening are welded to the top of the base channel in the original design, but subsequent units have another 4-in. channel welded to the base of the jig to form a box section. Two 1-in. by 5½-in. holes, spaced 17 in. apart, are cut through the channel flanges for insertion of the lift-truck forks. Additional stiffness is also provided by two corner braces.

At the end of the upper horizontal arm of the jig is a U-shaped hook and pivoted cover plate with suitable locking pin to avoid any possible disengagement of the lifting chain, generally attached to the box-car door at the placard board holes or door handle, whichever is more convenient.

In operation, the door is simply raised to the desired elevation by the fork-lift truck which moves alongside the car. One man guides the door as it enters the track. It is then pushed forward by the truck until fully supported on the track. Fifteen minutes or less are required to apply the average box-car door with practically no manual labor or chance of personal injury.

This jig is reversible and can be applied to the lift-truck forks in either position. It can be used for hanging doors on either side of the box car.

Tool for Milling Journal Bearing Wedge Dies

Steel guide and machined follower with clevis-mounted ball bearing (left) make up device installed on the vertical miller (right).

A device to simplify milling of dies for the reforging of journal bearing wedges has been developed by the Illinois Central at its Paducah shops. A steel guide, machined to a 50-in. reverse radius, is bolted on top of the die block. A permanent transverse center-line on the guide coincides with the center-line layout on the die block so as to center the radius properly with relation to the finished die. A machined follower is fitted with a clevis-mounted ball bearing to roll longitudinally and crosswise on the guide radius. It is bolted to the movable head of the vertical miller. The head is disengaged from power feed. Counterweights suspended from a steel bar clamped to the hand feed handle hub by a U-bolt keeps the ball bearing pressed against the contoured guide.

The vertical adjustable crosshead containing the ball bearing mount must be moved upwards and locked each time the tool is set for a deeper cut, because the tool cannot be lowered otherwise. All cuts are started on the center-line where the maximum cut is taken, and worked towards the ends. Use of this device saves $75 per die set, eliminates hand grinding, and cuts errors.

Brake Applications Limit Wheel Slip

Slip suppressing brake has proved effective in controlling slip of high-horsepower locomotives

By J. C. Aydelott

Correction of wheel slip on American diesel-electric locomotives has usually been some scheme for automatically reducing or completely removing and reapplying power to traction motors. Single-unit electric locomotives in Switzerland have employed the so-called anti-slip brake, a manually operated type of wheel-slip correction (RL&C, Jan. 1957, p 46). This scheme, now known as the slip suppressing brake, has been adapted for American application and installed on the General Electric 2,500-hp U25B diesel-electric locomotive (RL &C, June 1960, p 25).

In correcting wheel slip, there is a basic difference between the slip suppressing brake and the traditional arrangements for reducing power. When one of a locomotive's axles is slipping, it is running faster and at lighter load than those which are not slipping. Because the slip suppressing brake is applied equally to all axles, maximum power is absorbed from the slipping axle and minimum power from the non-slipping axles.

Power reduction decreases the input to all axles proportionally and, therefore, takes the least power from the slipping axle because it is already only lightly loaded. With the slip- suppressing brake there is minimum disturbance of engine output. When the slip is corrected, the locomotive is once more delivering full horsepower with minimum loss of time.

The slip suppressing brake employs most of the regular air-brake system. The truck brake arrangement is unchanged. On the locomotive platform a relay valve is placed as close as possible to each truck and connected to it with a large, short pipe to insure application in minimum time. The relay valves are supplied with air at 140 psi from the main reservoir and are actuated by an air signal. The pressure which comes to them through the control pipe is promptly reproduced in volume in the brake cylinders. This is the way in which normal brake applications are made.

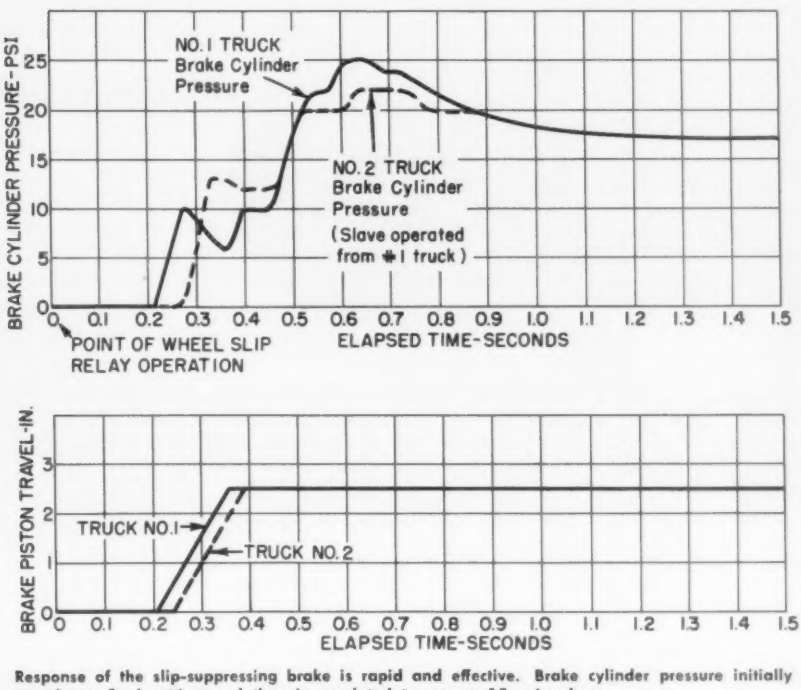
All the equipment on the locomotive is necessarily well maintained for the basic function of mechanical braking. The added brake devices for the slip suppressing brake are low in cost, few in number, extremely reliable, and require maintenance only at the time that other air brake devices receive maintenance. The slip suppressing brake function involves relatively light duty for the brakes and results in only a negligible increase in wheel and brake-shoe wear. It does not increase the overall duty on the compressor appreciably. An individual application consumes only 16 cu ft of air. Succeeding slips require less air because the time delay reservoir will be charged. A slip every five seconds, a highly improbable maximum, results in less than 20% load for the compressor.

To achieve slip suppression, a 15 psi signal is fed to the relay valves. This is introduced through a shuttle valve, sometimes called a double check valve. It resembles a pipe tee with the central leg feeding the relay valve control line. The shuttle signals the relay by moving to connect one or the other of the legs of the tee, whichever has the higher pressure. A 15 psi pressure is produced by a specially designed pressure regulating valve. This is connected to the locomotive air supply and is turned on and off by a magnet valve.

The pressure regulating valve is designed to provide the fastest possible application of the slip suppressing brake by deliberately letting the control pressure overshoot momentarily and then bringing it back to 15 psi. While the magnet valve is closed, no air is flowing and the pressure regulating valve is in wide open position.

When the magnet valve opens, high-pressure air rushes through the pressure regulating valve and into the relay valve. A corresponding surge of high-pressure air enters the brake cylinders

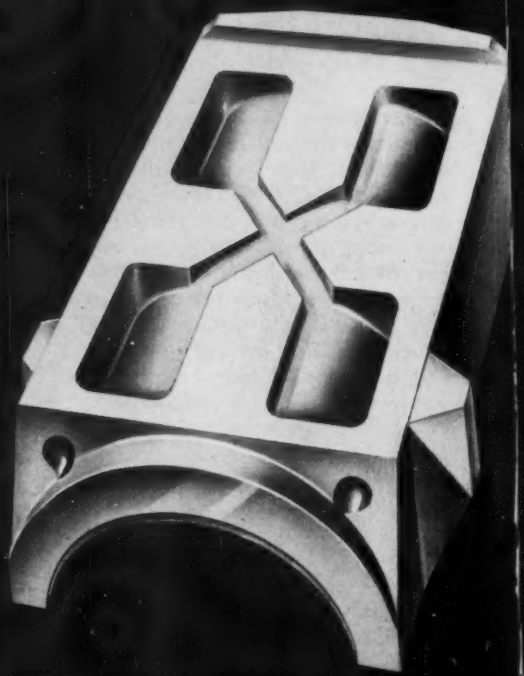
Mr. Aydelott, Advance Locomotive Project, General Electric Co., Erie, Pa.



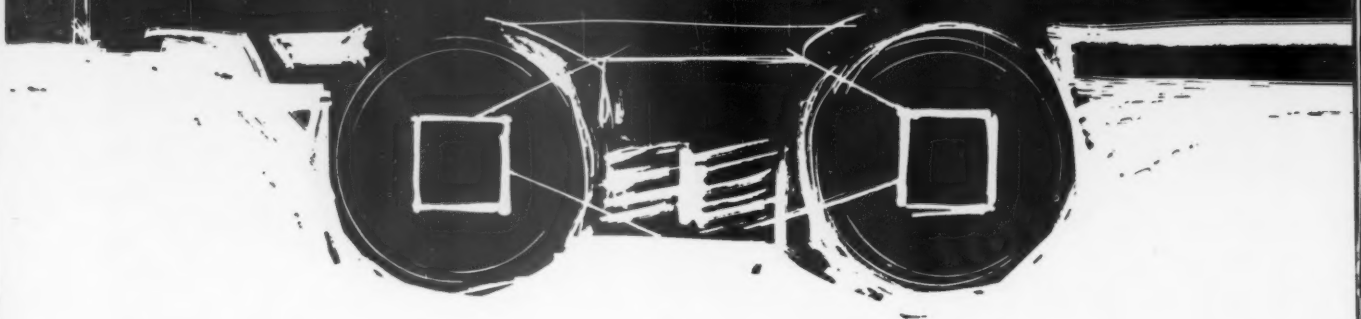
Response of the slip-suppressing brake is rapid and effective. Brake cylinder pressure initially overshoots final setting and then is regulated to proper 15 psi value.

POSITIVE CONTROL

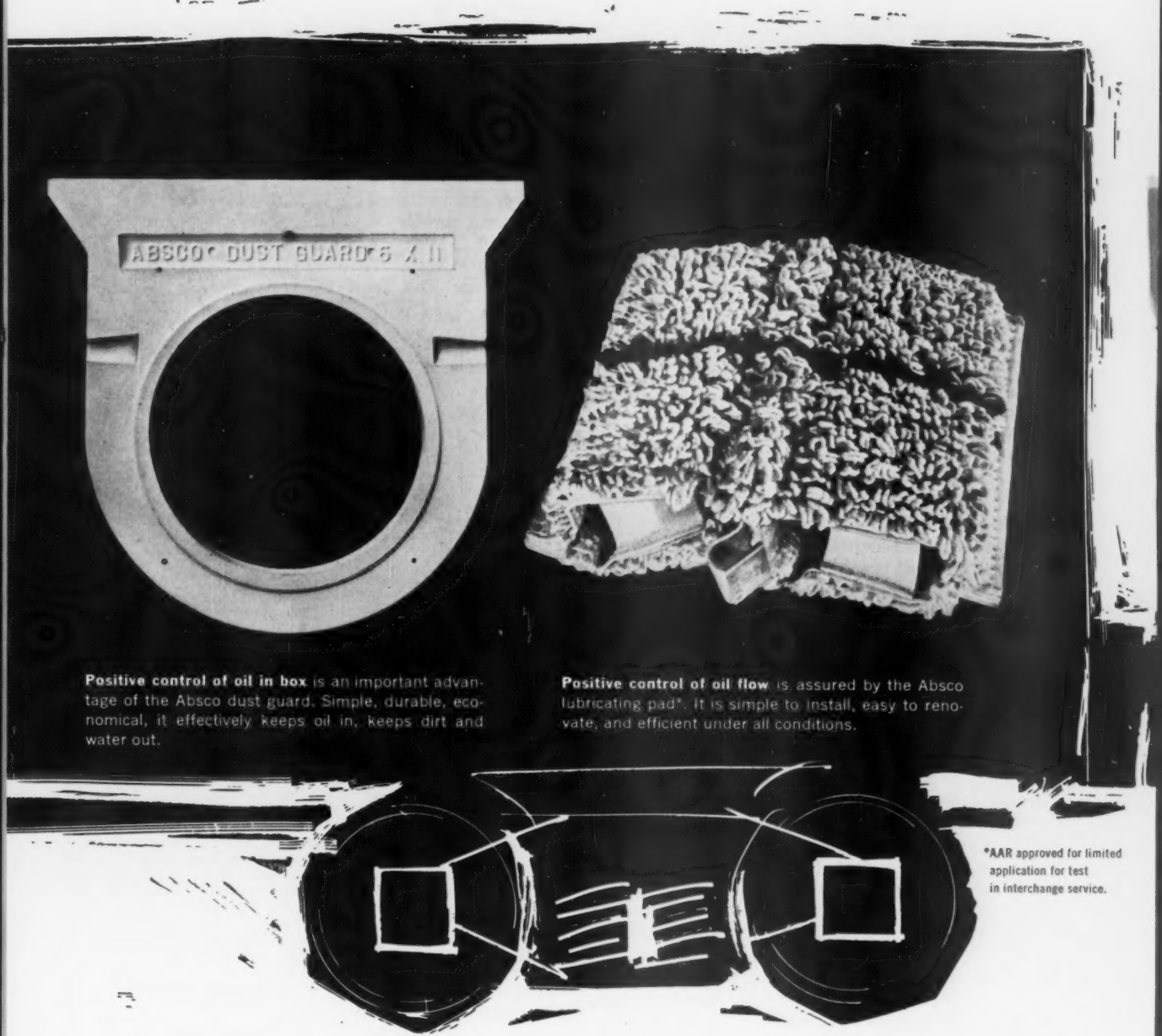
KEY TO BETTER JOURNAL BEARING PERFORMANCE



Positive control flatback bearing® achieves stabilized journal assembly without any alteration or modification of box. It has established an impressive record for longer life and fewer hot boxes.



■ Dollar for dollar, this Absco positive control "package" appears to be the most efficient bearing assembly available. Applied to the average interchange car of today and tomorrow, it gives highest promise of upgrading bearing performance for the total fleet. ■ The key to this concept is positive control of journal and bearing motion, positive control of oil in the box, and positive control of oil flow to the journal. ■ To stabilize the axle, without the expense of journal stops and box modification, use Absco positive control flatback bearings. To keep oil in the box and foreign material out, install simple, inexpensive Absco dust guards. To feed sufficient quantities of oil to the journal, rely on Absco



Positive control of oil in box is an important advantage of the Absco dust guard. Simple, durable, economical, it effectively keeps oil in, keeps dirt and water out.

Positive control of oil flow is assured by the Absco lubricating pad*. It is simple to install, easy to renovate, and efficient under all conditions.

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to start the pistons and brake shoes. The regulating valve senses its output pressure through an orifice. Orifice size has been chosen experimentally so that the rush of air is cut off at about the time the brake shoes hit the wheels. The pressure then levels off and is regulated at 15 psi. If the brakes are adjusted for minimum travel, a slight overshoot in pressure may occur for a short time, but this does no harm.

Should the regular brakes be applied at any time while the slip suppressing feature is functioning, the shuttle valve changes position as soon as the pressure in the control line exceeds 15 psi and the regular air-brake control takes over. It also prevents loss of brakes if any trouble should develop in the slip suppressing devices.

M-U Problem

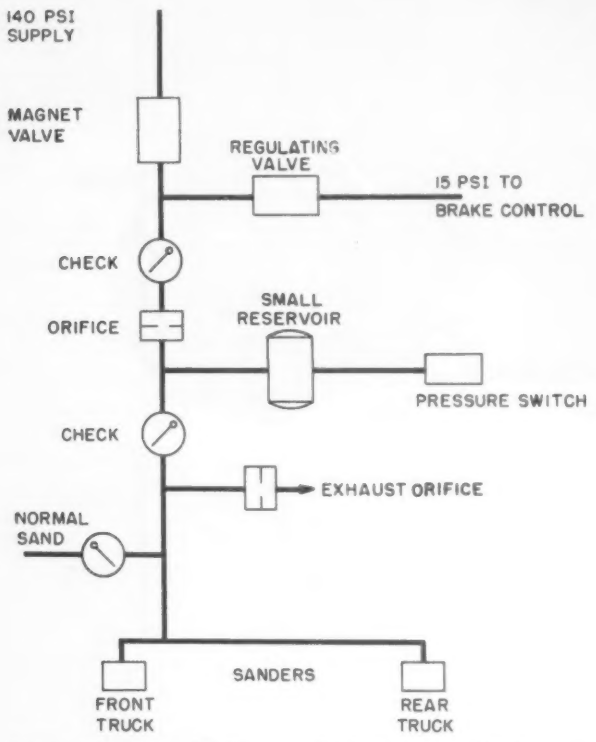
In Europe, locomotives are used as single units, and the operator is expected to respond to any slipping which may occur. In many cases, he knows his route so well that he is able to anticipate slipping. He presses a button which actuates the magnet valve and slip suppressing brake. While the U25B locomotive has such a push button which may be used by the operator, the prevalence of multiple-unit locomotives on American railroads made it necessary to provide also for completely automatic operation of the slip suppressing brake.

For automatic operation, a dependable slip detection system is necessary. The U25B locomotive is equipped with the GE adhesion loss detection system (RL&C, May 1959, p 47). A small, sturdy alternator is installed on each axle. Outputs of these are compared continuously, and difference in speed of the several axles produces a signal.

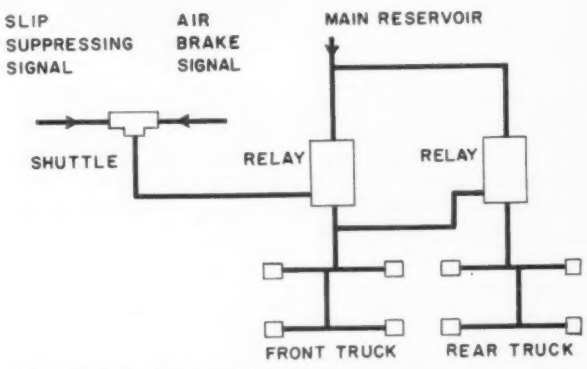
If the locomotive is operating under power when a slip is detected, several things occur automatically on the slipping unit before the operator's warning light and buzzer come on. This time delay is intentional. It is recognized that enginemen on most locomotives have not been aware of the great amount of slipping which occurs at high locomotive speeds. Because most slips can be corrected automatically, it is considered better not to call them to the attention of the operator. When several units are operating in multiple, it is an advantage to have each unit take care of its own slipping.

The adhesion loss detector works equally well at all locomotive speeds. This is particularly important on a high-horsepower locomotive where undetected slips at high speed might continue for miles. Such a condition would involve loss of horsepower,

Locomotives on which the slip suppressing brake has been tested are the two U-25B demonstrators which General Electric put on the road last summer. Seven months of operation on 14 main-line railroads, according to GE, "demonstrated the capability of the twin units to integrate with regular locomotive fleets and to pull fast freight trains with fewer units." During their demonstration runs, the two units were assigned to high-speed piggyback trains, conventional through freights, and slow-speed, heavy-drag operations. One road assigned the two U-25B's to handle a high-speed freight run which is usually 3,500 to 4,000 tons and is regularly pulled by three 1,500-hp units. The accepted five-hour running time was better by about one hour. One road found that the two units could handle 190 cars, about 16,000 tons, "in faster running time than the conventional units," and that they performed well on wet rail. Enginemen said the 16-notch controller was helpful in starting heavy trains and regulating low-speed operations.



Arrangement of the quick-slip-suppressing brake control which incorporates time delay in sanding and in giving slip indications.



Schematic of air piping involved in application of slip-suppressing brake. Components were developed by New York Air Brake Co.

damage resulting from over-speeded traction motors, and sometimes motor and generator flashovers.

Quick slip detection and prompt slip correction help keep traffic moving at top speed. Detection of very small differences in axle rpm is not practicable. Allowance must be made for differences in wheel size.

The standard adhesion loss detector was modified to determine axle acceleration as another means of detecting slip. A rate of acceleration was chosen that is a little above the maximum acceleration that might be experienced for the whole locomotive in special service, such as kicking cars. Use of the acceleration feature to detect slipping is especially valuable when slips occur suddenly. This feature permits correction sooner and before the rapidly accelerating axle can reach such a high speed that appreciable time would be required to bring it back into rolling contact with the rail.

In some cases, slip does not occur suddenly and acceleration might not be sufficient to give an indication. The speed differential feature then comes into action and the slip is corrected. In such cases, excessive speed is not a problem and, because adhesion is partially effective, the loss of tractive effort is minor.

Slip Correction

Whenever slipping results in rapid acceleration or produces the selected difference in axle speeds, a sensitive relay operates in a few milliseconds and in a tenth of a second, the contacts of a power relay close and several slip corrective measures are initiated. Initially, the slip suppressing brake is applied. It is fully applied on both locomotive trucks in less than one-half second. This corrective action is so prompt and so effective that most slips are arrested and the full pulling power of the locomotive restored in a matter of two or three seconds.

The U25B locomotive control is also designed to take care of exceptional conditions. The magnet valve which actuates the slip suppressing brake also feeds 140 psi air through an orifice into a small reservoir, which continuously discharges through a small outlet orifice, providing a time delay system. In case of slip last as long as three seconds, air pressure builds up to a point which initiates sanding, and the closing of a pressure switch actuates the light and buzzer in the operating cab.

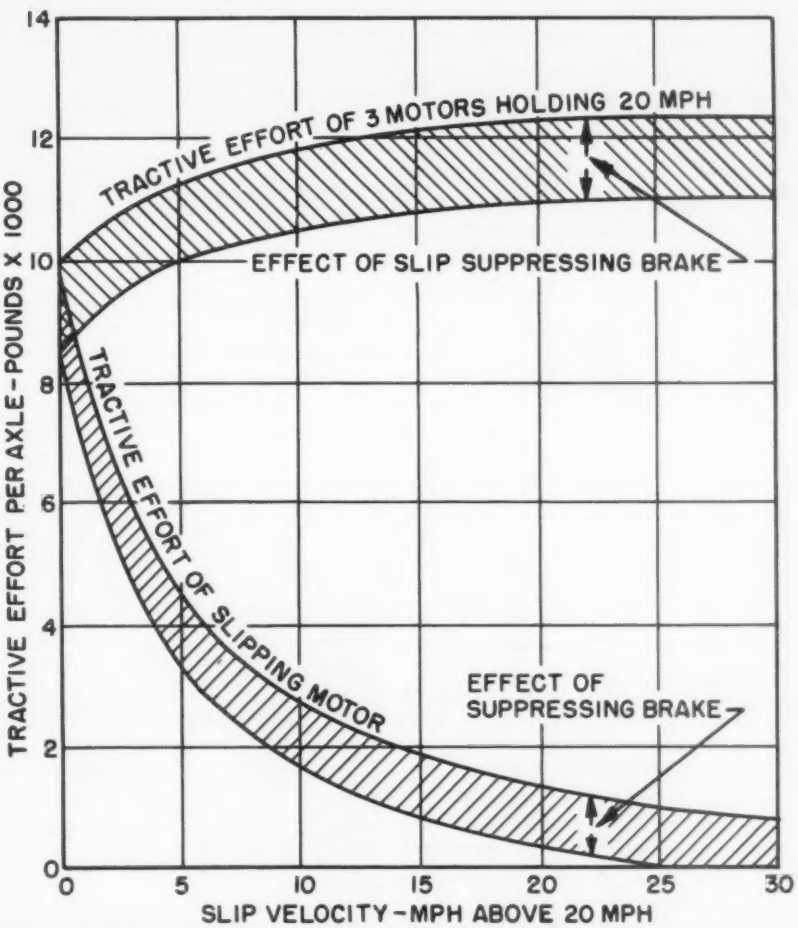
This is the first warning that the operator has that one of his locomotive units is slipping. It also tells him that the slip suppressing brake has been applied, that automatic sanding is taking place, and that the power of the slipping unit is being gradually reduced. After the operator has become accustomed to this system, he will know that he can wait to see what happens next. With experience, he will develop judgment to decide whether he need take any action. When the slip signal stops, the brake, buzzer, and light are all cut off. This occurs while there is still a speed difference of a few miles per hour between the various locomotive axles, so automatic sanding is continued briefly until the pressure in the small reservoir leaks off.

The same signal which quickly applies the slip suppressing brake and, after a time delay, provides automatic sanding, simultaneously reconnects the excitation circuits to reduce power on the unit which is slipping. The exciter field current is reduced as the magnetic flux in the exciter decays and this, in turn, reduces the main generator field current as the magnetic flux in the main generator decays. Since both fields normally operate in a somewhat saturated state and one follows the other, only a small gradual reduction in traction motor current results.

The overriding solenoid in the engine governor is also energized in such a way that it moves the load control potentiometer toward minimum field. Its movement from maximum field position to minimum field position takes about 20 seconds. Generally, the prompt application of the slip suppressing brake with the occasional help of automatic sanding corrects slips so rapidly that there is very little reduction in engine output.

When the operator chooses to notch back on the throttle, power on all units will be reduced. This reduction will be greater on units on which the load control rheostat has already reduced

(Continued on page 45)



Slipping characteristics and effect of the brake during slip with 2,500 hp for traction and all four motors in parallel. One motor is slipping and three are holding a constant 20 mph.

Crankcase explosion caused by hot bearing was one of several which occurred during the year. It resulted in one injury.

Lower half of traction motor gear case which failed at mounting pad dropped to track and derailed passenger train, injuring 23.

Annual ICC and ICC Bureau reports . . .

Locomotive Condition Improves; Car

ICC reports for 1959 and 1960 show diesel engines, brake equipment, and sanders to be the locomotive components most frequently found defective during inspections made under the Locomotive Inspection Act. The 49th annual report of the Director of Locomotive Inspection, covering fiscal 1960, reveals that 10.1% of the units checked during 105,702 separate inspections showed "defects or errors in railroad inspection that should have been corrected before the locomotives were put into use."

The 10.1% rate was a drop from the 10.3% of other-than-steam units found defective in 1959. There were 32,186 of these units in service in 1960; 31,862 in 1959. The Director reported that last year "531 locomotives were ordered from service because of defects that rendered the locomotives immediately unsafe. This was a decrease of 117 locomotives compared with the preceding year."

The 50 accidents attributable to locomotive defects during 1960 resulted in 81 injuries. During the previous year there were 66 accidents and 90 injuries. There have been no fatalities resulting from locomotive defects since 1956.

How Frequently Do ICC Inspectors Find Defects on Diesel and Electric Locomotives and MU Cars?

	Locomotives	
	1959	1960
Units reported	31,862	32,186
Units inspected	102,149	105,702
Units defective	10,473	10,638
Total defects	31,171	31,427
Per cent defective	10.3	10.1
Ordered from service	628	517
	Mu Cars	
Units reported	2,717	2,671
Units inspected	2,231	2,571
Units defective	362	450
Total defects	834	1,254
Per cent defective	16.2	17.5
Ordered from service	4	11

"Of the 50 accidents," the Director of Locomotive Inspection comments, "10 were caused by the defective condition of floors, steps, and passageways of diesel-electric locomotives. Seven of the 10 resulted from accumulation of oil on walking surfaces, a reduction of 5 compared with the preceding year. Eight accidents were caused by defective condition of cab seats, compared with 12 in the previous year."

Safety Appliances

The report on safety appliance inspections by the ICC Bureau of Safety and Service, Section of Railroad Safety, shows that, while locomotives were in somewhat better condition in 1960 than had been the case in 1959, both freight and passenger cars were found in somewhat poorer condition. Agents of the Section of Railroad Safety found 5.40% of 1,579,463 freight cars with safety appliance defects last year as compared with

Most Common Defects on Diesel and Electric Locomotives

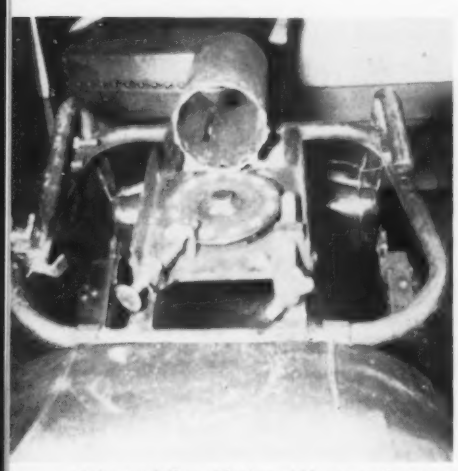
Partial list of parts defective, inoperative or missing, or in violation of ICC rules found during inspection of 102,149 in 1959, and 105,702 in 1960.

	1959	1960
Brake equipment	3,477	3,617
Cabs and cab windows	1,419	1,407
Cab floors, aprons, and deck plates	2,768	2,461
Controllers, relays, circuit breakers, magnet valves and switch groups	613	704
Fuel system	3,343	2,702
Inspections and tests not made as required	682	1,063
Internal-combustion engine defects, parts and appurtenances	6,555	7,184
Jumpers and cable connectors	355	350
Lights, cab and classification	480	404
Motors and generators	787	821
Sanders	3,613	3,602
Springs and spring rigging, driving and truck	542	512
Trucks	823	765
Wheels	382	798
Miscellaneous	1,491	1,400

Fleet Shrinks

4.81% of 1,183,040 in 1959; 1.04% of the 122,151 locomotives had these defects in 1960, a figure which was down from 1.28% in 1959.

Air brake tests were observed on 3,708 freight trains—233,333 cars—by inspectors during the past fiscal year. Proper tests were observed on 3,051 of these trains (67.6%), and improper tests on 717. Proper tests were observed on 94.9% of the passenger trains. Inspectors also observed air-brake shop practices 977 different times and rated 87.7% of these as proper.



Cab seat failures like in weld between the stand and frame have resulted in injuries.

Brake Defects

Commenting on air-brake defects, the Section on Railroad Safety reported the following about the cars and locomotives which were checked:

	1959	1960
Air brakes cut out or inoperative	1,608	2,380
Air brakes not cleaned in required period	2,253	11,373
Excessive piston travel	3,573	6,397
Total	7,434	20,150

Few units were found with out-of-date brake cleaning during 1959 because that covered the period when AB brake cleaning was being extended from 36 to 48 months. The Section reported that the increase in the number of cars and locomotives found with excessive piston travel in 1960 was due to the fact that the number of trains observed went up from 2,845 in 1959 to 4,595 in 1960.

The annual report of the Interstate Commerce Commission indicated concern about the shrinkage of the U.S. freight-car fleet, which went down 73,481 cars. After conceding that 1960 installations might "more nearly equal normal retirements," the report hastens to warn that "this degree of balance may be short lived unless large orders are placed soon as the backlog was declining rapidly . . . The freight-car supply situation has been a serious problem for many years. Inadequate car ownership and inefficient utilization of existing equipment on the part of some carriers have been the prime factors causing such shortages. The situation has also been aggravated in recent years by a substantial increase in percentage of unserviceable cars."

Total Class I freight-car ownership on January 1, of this year was 1,661,577, and the bad-order ratio, 9.4%.

"Enactment of recommended legislation would assist the Commission in coping with this problem by authorizing it to prescribe per diem rates which would provide an economic incentive to the carriers to procure and maintain an adequate supply of freight cars."

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Mitchell's Runaway Horses

By Jon Maurice

Red streamers across the western sky marked the end of day as Foreman Brad Sparks headed out of the shop toward the inbound lead at the diesel terminal. Brad had just had word that locomotive 154 on the express had encountered trouble, resulting in some delay. As he walked, Brad recalled that 154, a three-unit, 6,000-hp Alco, was one of the few not yet rebuilt with the latest electrical equipment.

As the big Alco rolled to a stop, Brad noticed the lead unit engine was silent. Engineman Cy Mitchell's worried expression changed to a grin when he spotted Foreman Sparks.

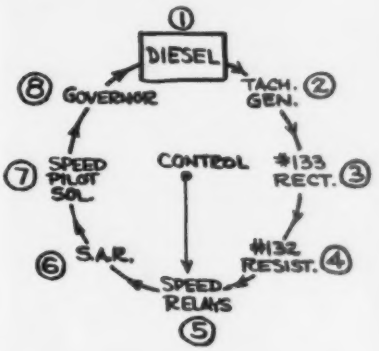
"Hello Cy;" said Brad, "what happened to your engine?

"Don't know exactly," exclaimed Engineman Mitchell; "the 2,000 'horses' on this A unit took the bit in their teeth and ran off. We were just coming out of that sag at Oak Hollow. I opened the throttle to eighth notch and this engine just speeded up till the 'overspeed' tripped. We reset the overspeed and tried again. Same thing happened. If you don't mind, I'd like to stick around to see what got into these horses."

"All right," said Brad; "let's get on and see what's wrong."

Brad and the engineman were standing at the engine control panel when Electrician Bender came into the unit with test meters and tools. Bender was told to place an ammeter in series with the speed coil circuit. "A number of things could cause trouble in that circuit," Brad explained, hastily drawing a sketch in his notebook and showing it to the engineman.

"I have numbered the major components of speed control, starting with the engine as '1.' The tachometer generator, 2, is driven off the engine gear train with its frequency and output voltage proportional to engine speed. It detects changes in engine speed and proportional current is fed through the speed control circuits to the speed



Brad's sketch showed the engineman the components of the Alco speed control system.

pilot solenoid on the engine governor. One of the first checks must determine if the 'tach' generator is supplying operating current. Electrician Bender has an ammeter in series with the speed coil circuit on the d-c side of the '133' rectifier. Let's start the engine and see if the tach generator is doing its job."

When started, the engine idled at higher than normal speed. Brad pointed out that the governor-to-rack linkage was vibrating and that the speed pilot was buzzing. Engine speeds proved to be high in all eight throttle positions. Brad turned the EC switch to off position, shutting the engine down.

"I was getting readings on the meter," Bender said, "but there's something erratic about this speed circuit."

"Everything points to that tach generator," Brad replied. "High engine speeds, vibration of rack linkage, and buzzing at the speed pilot solenoid all indicate that the tach generator has a winding defect, maybe an open phase, or that there is something wrong on the a-c side of the '133' rectifiers."

Quick inspection of the amphenol plug at the tach generator and of the "133" rectifier connections revealed no defects. Brad instructed Electrician Bender to obtain a new tach generator from the electrical shop. "Our trouble is probably an open phase in the generator windings," Brad explained.

"Golly," exclaimed Engineman Mitchell, "there certainly is a lot going on back here when I move that throttle up in the cab. That little gadget at the governor has me puzzled. What did you call it?"

"Speed pilot solenoid," replied Brad. "That's '7' on your sketch. It positions a balanced hydraulic valve as commanded by the current furnished by the tach generator. The position of the pilot valve is determined by a balancing or unbalancing of two forces. A *mechanical* force, in the form of a reference spring, exerts an *up* force on the pilot valve. A *magnetic force,* created by tach generator current passing through the speed coil windings, exerts a *down* force. A current of 0.475 amp flowing thru the speed coil windings creates a magnetic force *down,* equal to the mechanical force of the reference spring *up*. This is called a balanced pilot valve. Oil ports in the pilot valve, which permit the flow of oil under pressure to the governor slave pistons to operate the engine fuel racks, are blanked off in the balanced position. The engine speed is held at speeds corresponding to the throttle positions."

"Well," asked Engineman Mitchell, "if this pilot valve is balanced, how do we get more speed out of the engine?"

"Easy," said Brad, "let's assume this engine is in Run 1 speed, remembering the speed pilot valve is balanced. When the throttle is moved to Run 2 position, a circuit energizes the speed relay AVS to insert additional resistance in the speed coil circuit. Tach generator current is reduced to below the 0.475 amp needed to balance the pilot valve. The valve is now unbalanced in the *up* position. Mechanical force of the reference spring is greater than the magnetic force of the speed coil. Oil now flows to the *speed increase* components of the governor. As engine speed increases, tach generator voltage increases proportionally. Engine speed will increase until the tach generator voltage increases sufficiently to deliver 0.475 amp through the additional resistance, again balancing the pilot valve." *(over)*

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

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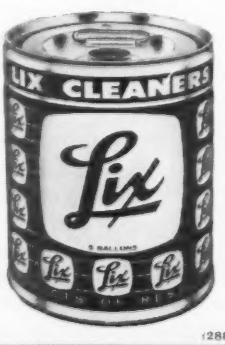

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(2886)

"What happens if I move the throttle back from 2 to 1 to reduce speed?" asked the engineman.

"Well," answered Brad, "when the throttle is moved from 2 to 1, speed relay AVS drops out, removing the resistance from the speed coil circuit. Current to the coil goes *above* .0475 amp and the magnetic force *down* overcomes the reference spring, forcing the pilot valve *down*. Oil flows to the *speed decrease* components of the governor. Engine speed drops until the tach generator is again delivering 0.475 amp to the speed coil, balancing the pilot valve and holding the engine at Run 1 speed."

"I'm beginning to see the light," said Mitchell. "How is speed set for each of the eight throttle positions?"

"Electrician Bender has just about finished installing the new tach generator," Brad responded, "but we will clear up your question before we check the results. Engine speeds in each of the eight throttle positions are set by adjusting the notching resistors, using a master tachometer to indicate correct engine speeds. Adjustment of the '132' resistors varies speed coil circuit resistance to obtain manufacturer's specified RPM for each throttle position."

"All set for a check," the electrician called.

"OK," said Foreman Sparks, "you have the master tachometer plugged in the panel, so we'll crank the engine and check performance."

Brad started the engine and noted the idle performance was smooth and normal. Speed was almost correct. The rack linkage was steady; there was not buzzing at the speed pilot solenoid. Brad told Bender to check the RPM in all throttle notches and make necessary adjustments. He explained to Engineman Mitchell that slight differences in the new tach generator windings and permanent magnets could make it necessary to reset speeds.

"Our trouble was a defective tach generator?" asked Mitchell.

"Right," said Brad. "Apparently there is an open phase in the internal windings. This case has been quite simple to diagnose. It did permit me to explain the major components and the basic concept of speed control. From the tach generator to the engine fuel racks there is a chain of command which makes it possible to release and control those 2,000 horses."

(Continued from page 10)

ible. The small amount of heat they generate is easily removed."

For two years the French National Railways has been looking into the potentials of silicon rectifiers and has conducted tests on a 5,000-hp a-c locomotive, M. Tessier, electrical engineer of the French Railways, reported. "This unit has given complete satisfaction," he said. "Today we believe that it is possible to build locomotives with silicon rectifiers. To prove this, we have ordered fifteen 3,600-hp silicon rectifier locomotives of the BB type for freight service. These will be put in service in April. The French National Railways has also put into operation stainless-steel commuter cars equipped with silicon rectifiers. On these multiple-unit cars tests are being made of three different types of silicon rectifiers."

Mr. Tessier commented on the improvement in adhesion possible with a single motor on each truck of a locomotive. Gearing the axles together, as required by this arrangement has made possible the development of rail wheel adhesions higher than 35%, and the French National Railways uses a starting adhesion of 30% for these locomotives.

"Epoxy resins have often been presented as the 'miracle' material," I. N. Elbling of Westinghouse Electric Corporation stated while discussing the material which has proved increasingly popular for railway electrical applications. "While the electrical industry is traditionally skeptical about any 'miracle' material, epoxies have taken a firm and expanding position because of their many unique properties and unique possibilities."

First large-scale use of epoxy resins in the U. S. was by the coatings industry. The electrical industry has made use of epoxy resins in much the same manner. Epoxy coatings have found their place as insulating varnishes, wire coatings, and protective barriers of all types.

The nature of epoxy resins has also lead to their widespread use as encapsulants and potting materials. Dielectric properties of epoxy resins are superior to those of most polyesters and most phenolics. Their 100% reactivity, low-water absorption, high impact strength, low shrinkage, and ease of application make them highly suitable for potting, casting, and encapsulating electrical components. The outstanding adhesion of epoxy resins to glass is responsible for the excellent properties obtained with glass-cloth-epoxy laminates, Mr. Elbling said. Epoxy resin laminates are higher in cost than polyester or phenolics, but their superior properties warrant the additional cost. They have mechanical properties superior to polyesters and their electrical properties are better than phenolics. Water resistance is superior to both polyesters and phenolics.

Third Improved Lubricator Swab Approved

Gustin-Bacon Pc No. 0310 has been added to the AAR Mechanical Division list of hollow-rod packing seals that will replace No. 517342 or BC-8664 seals for new installations or repair maintenance on modern style AB-10 brake cylinder non-pressure heads. This seal is to be considered in the same category as WAB Pc No. 562813 and NYAB Pc No. BC-80041 previously reported to be used, effective January 1, 1961.

TTX Orders 600 Cars; Starts Sixth Year

Trailer Train has ordered, and is receiving deliveries of, 500 85-ft roller-bearing piggyback flat cars from ACF, Bethlehem Steel, General American, and Pullman-Standard at an estimated total cost of $8,100,000. The cars, described as being "of several different but compatible designs," will increase Trailer Train's total fleet to 6,259 units. Trailer Train, which is now beginning its sixth year of operation, has a total membership in the piggyback car pool of 34 railroads and one freight forwarder.

The Norfolk & Western is building at its Roanoke shops 1,000 85-ton coal hopper cars at an estimated cost of $12,000,000. These are in addition to the 1,000 85-ton hopper cars described in the November 1960 issue, page 25. Production is expected to be at the rate of four to eight cars per day.

The Erie-Lackawanna has received 10 piggyback cars built by General American Transportation. The ten G85 cars are designed for operation at speeds of 80 to 85 mph in passenger-train service. Steam and

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signal lines are built into the piggyback cars. Cars will handle milk in truck trailers.

The Frisco has ordered 100 70-ton, 50-ft insulated box cars from ACF. Cars will be equipped with cast-steel underframe ends from General Steel Castings; cushion underframes; lading protection devices, and roller bearings.

The Philadelphia Passenger Service Improvement Corporation, in its capital program for 1961-1962, plans to buy 52 commuter cars at a cost of $11,000,000. The Pennsylvania is slated to receive 36 cars; the Reading, 16. The 26 cars to be ordered in 1961 are budgeted at $6,500,000.

The Toledo, Peoria & Western has ordered for April delivery, one 1,800-hp GP 18 road switcher. This Electro-Motive unit will replace one 1,500-hp F 3 unit.

Personal Mention

Canadian National.—Five regions established under revised organizational structure—Atlantic (Moncton, N.B.); St. Lawrence (Montreal, Que.); Great Lakes (Toronto, Ont.); Prairie (Winnipeg, Man.), and Mountain (Edmonton, Alta.)—subdivided into administrative units to be known as areas. Regional and area appointments as follows: ATLANTIC REGION, *Maritime Area:* DAVID A. FOSTER, superintendent of equipment. *Chaleur Area* (Campbellton, N.B.): THOMAS F. HOYT, superintendent of equipment. Formerly master mechanic, Campbellton division. J. W. GILLIS, assistant superintendent of equipment. Formerly car foreman at Edmonton. GREAT LAKES REGION: W. D. PIGGOTT, general superintendent equipment; G. L. GALLOWAY, assistant general superintendent equipment; J. J. HARRIS, special assistant (car equipment); F. W. BROUGHTON, mechanical and electrical engineer; A. R. TURNER, supervisor motive power; A. E. TAYLOR, supervisor car equipment. *Toronto Area:* R. M. VEENIS, superintendent of equipment; W. D. ROSS, assistant superintendent equipment; D. YOUNG, diesel supervisor; W. D. PHILLIPS, electrical supervisor; F. A. PETERS, apprentice instructor. *London Area:* (London, Ont.): R. J. CRUX, superintendent of equipment; C. YOUNG, assistant superintendent equipment; E. SUSSENS, electrical supervisor. *Northern Ontario Area* (Capreol, Ont.): R. BABB, superintendent equipment; K. G. LUSK, traveling care foreman; G. C. FULCHER, electrical supervisor. ST. LAWRENCE REGION: K. E. HUNT appointed general superintendent equipment, succeeding W. D. PIGGOTT. *Quebec Area:* M. HUNEAULT, superintendent equipment; L. P. TROTIER, assistant superintendent equipment; H. S. MCTEER, general foreman motive power; J. B. PARADIS, diesel supervisor; R. A. MANICOM, electrical supervisor; J. H. VACHON, assistant electrical supervisor; J. L. PAGE, apprentice instructor; J. R. DELISLE, traveling car foreman; J. E. SAUVE, boiler inspector. PRAIRIE REGION. N. D. COWAN, general superintendent of equipment. *Transcona, Man.:* J. W. JACKSON appointed superintendent of

car shops, succeeding Mr. Cowan. J. SUTHERLAND appointed supervisor of cars. Formerly superintendent Fort Rouge, car shops.

Chesapeake & Ohio. — *Cleveland, Ohio:* SERGEI G. GUINS appointed assistant director of research. *Richmond, Va.:* W. S. C. BURWELL appointed master mechanic, Richmond Division. Position of general foreman locomotive department abolished. *Russell, Ky.:* L. S. FIDLER appointed master mechanic, succeeding Mr. Burwell. *Peru, Ind.:* F. H. PORTER appointed general foreman, succeeding Mr. Fidler.

New York Central.—*Detroit, Mich.:* FLOYD F. DUBAY appointed superintendent maintenance—special car equipment.

Norfolk & Western.—*Roanoke, Va.:* JAMES A. HANCOCK, shop inspector, appointed mechanical inspector. J. L. OAKEY appointed car foreman, Shaffers Crossing, succeeding C. A. HENSLEY, SR., retired. ALBERT W. MANOR appointed assistant car foreman, Shaffers Crossing, succeeding Mr. Oakey. *Lamberts Point, Va.:* RAY W. SWANSON appointed gang foreman, succeeding Mr. Manor. *Portsmouth, Ohio:* LEO F. DEBO appointed assistant foreman, locomotive department. CARL C. RUTH, foreman electrician, appointed assistant enginehouse foreman, succeeding S. E. WALDIS, retired.

Pennsylvania.—*Chicago:* H. W. WITTMAN appointed master mechanic, Northwestern region. *Thorndale, Pa.:* L. E. OZBUN appointed assistant road foreman of engines. *Harrisburg, Pa.:* W. D. VOLKMER appointed motive power inspector.

Southern Pacific. — Mechanical Department headquarters reorganized, functions being divided between Maintenance-Operations and Engineering-Planning as follows. *San Francisco, Cal.:* N. L. MCCRACKEN named to head Maintenance-Operations section. F. E. RUSSELL in charge of Engineering-Planning section. Assisting Mr. Russell: P. V. GARIN, manager, Mechanical Engineering and Research, and R. E. HARRISON, manager, Maintenance Planning and Control. Assisting Mr. Garin: F. KURZ and A. S. PEDRICK, research and development; F. KEIPER, assistant manager, maintenance engineering and quality control; D. R. CALLERI, assistant manager, engineering and design; F. H. STENGLE, assistant manager, industrial engineering; N. A. PASSUR, engineer, car design and construction, and A. G. NEWELL, assistant to manager, mechanical engineering and research. *San Francisco:* G. F. PATTON appointed mechanical scheduler; L. S. BOYD, diesel engineer, and W. L. PREECE and M. R. GADDIS, traveling diesel supervisors. *Los Angeles:* J. W. RONAN appointed assistant superintendent, mechanical department, and A. C. GROVER, mechanical production planner. *Ogden, Utah:* C. B. FISH appointed master car repairer, Salt Lake Division. *Sacramento, Calif.:* L. P. OBERKAMP appointed superintendent of shops, succeeding G. M. CAGLEY, retired. H. J. HITKE named assistant superintendent of shops (car). C. F. JURSCH named industrial engineer.

OBITUARY

J. W. Atkinson, retired mechanical superintendent, Santa Fe, Shopton, Iowa, died December 3 at Mission, Kan.

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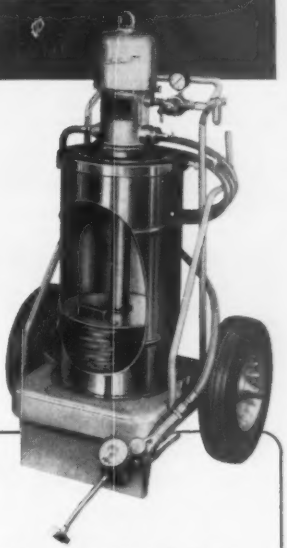

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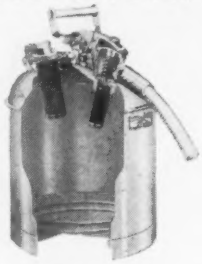

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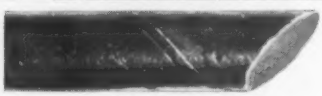

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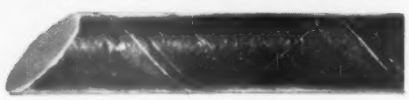

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Supply Trade Notes

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AMERICAN BRAKE SHOE CO.—*Raymond A. Frick*, a vice-president, Railroad Products Division, appointed executive vice-president of the division.

■

ELECTRO-MOTIVE DIV., GENERAL MOTORS.—*F. D. Lapham* appointed general administrative manager. Mr. Lapham formerly director of production control and purchasing.

■

AMERICAN STEEL FOUNDRIES. —*Ralph D. Brizzolara*, vice-president, retired. *E. A. Walcher, Jr.*, vice-president—manufacturing, Transportation Equipment Division, promoted to new position, with responsibility for coordination of research, product engineering, manufacturing, and sales activities.

■

MAGNUS CHEMICAL CO.—*Peter Catalanotto* appointed chemical and sales engineer.

■

AIR REDUCTION SALES CO., A DIVISION OF AIR REDUCTION CO.,—*J.W. Cunningham* appointed manager district sales office in Pittsburgh, Pa. *J. P. Casalis, Jr.*, appointed district manager, St. Louis district.

■

GENERAL ELECTRIC CO.—*Joseph T. Bailey* appointed manager, Locomotive Section, Locomotive & Car Equipment Dept., Erie, Pa. *Frank A. Compton, Jr.*, named to newly created post of manager of locomotive engineering. *W. Speicher* named manager of Locomotive engine subsection, succeeding *J. C. Rhoads*, deceased.

■

M & J DIESEL FILTER CORP. —*L. E. Gunther* appointed eastern representative, with headquarters in Richmond, Va.

■

UNITY RAILWAY SUPPLY CO. — *Mel H. Frank* of Mel H. Frank Co., Cleveland, named sales representative, Cleveland area. *L. E. Gunther* appointed representative at Richmond, Va.

■

VASCOLOY-RAMET CORP.—*Grid Sales, Inc.*, Baltimore, Md., and *W. R. McQuaid, Jr.*, of Jacksonville, Fl., appointed sales agents for railroad tooling.

■

SKF INDUSTRIES, INC.—SKF has acquired under a long-term lease a newly completed plant in Asheville, N. C., for the production and sales of Expediter railroad bearing.

Slip Suppressing

(Continued from page 35)

power than on units which are not slipping. Under such circumstances, the operator, guided by experience, should reduce power slowly. As soon as the slip indication ceases, the throttle should be opened to increase power as track conditions permit.

It is considered preferable to initiate an application of the slip suppressing brake on all axles of the unit when only one axle is slipping. When one axle slips, the power it loses is transferred to the axles that are not slipping. Their tractive effort and tendency to slip are increased. Because engine output tends to remain constant as a result of load control action, application of the slip suppressing brake to all the axles tends to prevent the slipping of those axles on which the tractive effort increases while simultaneously reducing the speed of the slipping axle.

A slippery film may develop on the locomotive drivers as well as on the rail (RL&C, May 1960, p 32). Rail adhesion is spotty, and the film on the wheels may sustain slipping from one slippery spot to the next. The action of the slip suppressing brake in destroying the film and cleaning all the wheel treads at the same time that it is bringing the slipping axle into normal rolling contact with the rail can restore full pulling power between slippery spots and facilitate getting the train over the railroad in minimum time. It is simpler to actuate the slip suppressing brake on all the axles when a slip is detected than it would be to try to single out and apply the brake to the axle which might be slipping at that instant. The simplest arrangement produces the most satisfactory result.

Wheel slips can be detected and corrected without drastically disturbing or upsetting the electric transmission system or the engine governing system of the locomotive. This minimizes the possibility of recurring slips resulting from the way power is reapplied, thus insuring that locomotive output can be maintained to keep the train up to speed.

The slip suppressing brake is effective at any locomotive speed. Moreover, contrasted with sand, it is always effective where it is wanted. Difficulty is often experienced in keeping sand on the rail at low speed. At high speed, this may become practically impossible.

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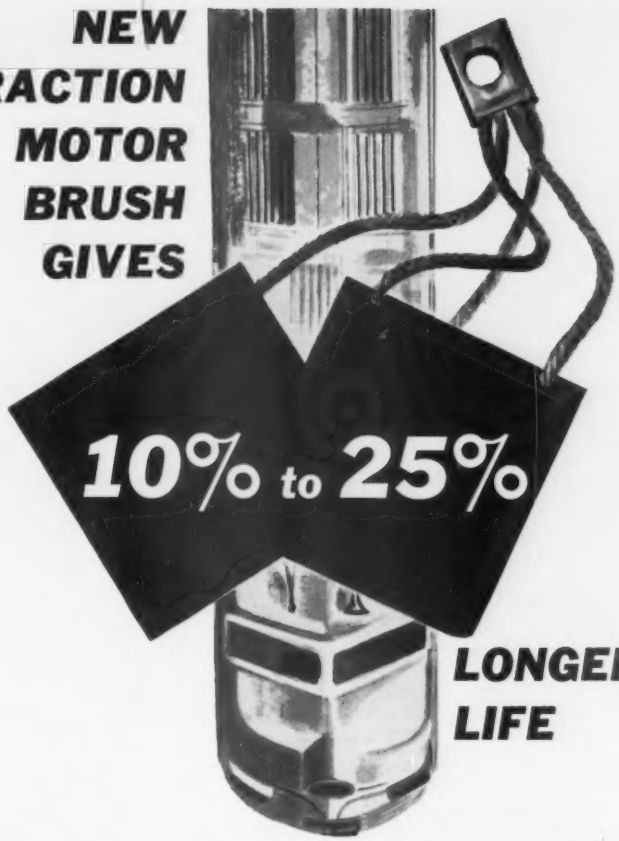

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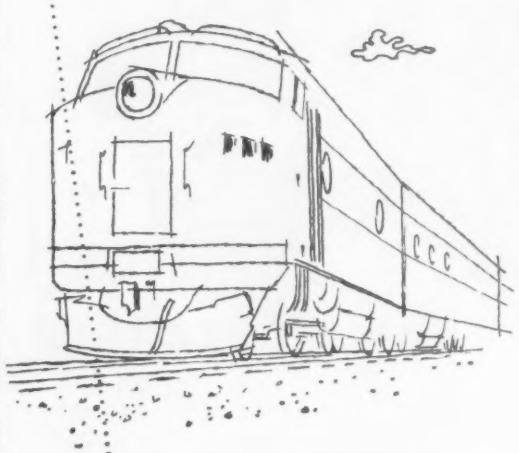

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WORKHORSE—This Class M-4 2-8-8-4 locomotive, with more than 280 tons over its 63-inch drivers, had a total engine-tender weight of 1,138,000 pounds. One of 10 locomotives of its type, No. 228 was built for freight service in 1943. **Photo courtesy Duluth, Missabe and Iron Range Railway Company.**
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